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INDEX TO VOL. XXII.

JANUARY 1 to DECEMBER 15, 1919.

INDEX OF AUTHORS.

- ARCHIBALD, Major R. G., M.B., D.S.O., R.A.M.C., and CHALMERS, ALBERT J., M.D., F.R.C.S., D.P.H.—A peculiar group of the *Coccaceæ*, 48
- ARCHIBALD, Major R. G., M.B., D.S.O., R.A.M.C., and INNES, Major ARTHUR, R.A.M.C.(T.).—Clinical and pathological notes on a fatal case of bilharzia treated by tartar emetic, 53
- ARCHIBALD, Major R. G., M.B., D.S.O., R.A.M.C.—Epithelial xerosis of the conjunctiva in natives of the Sudan, 81
- ARCHIBALD, Major R. G., M.B., D.S.O., R.A.M.C., and CHALMERS, ALBERT J., M.D., F.R.C.S., D.P.H.—Quinine metrorrhagia, 191
- ARMITAGE, Capt. F. L., N.Z.M.C.—Amœbic abscess of the brain: with notes on a case following amœbic abscess of the liver, 70
- BASSETT-SMITH, P. W., C.B., C.M.G., R.N., F.R.C.P., F.R.C.S., D.T.M. & H.—A case of sprue associated with tetany, 24
- BASSETT-SMITH, P. W., C.B., C.M.G., F.R.C.P., F.R.C.S., F.R.C.S., D.T.M. & H.—The infection of their young by trypanosome-infected mothers, 198
- BONNE, E.—A few notes on "bosch-yaws," the dermal leishmaniasis of Dutch Guiana, 122
- BRETT, Capt. P. M., M.B., R.A.M.C.—An acquired cranial deformity, 122
- BROUGHTON-ALCOCK, Major W., R.A.M.C.—A case of broncho-spirochaetosis (Castellani's bronchitis), 214
- CASTELLANI, ALDO, M.D., M.R.C.P., and TAYLOR, FRANK E., M.D., M.R.C.P.—A case of pentosuria contracted in the Tropics, 121
- CASTELLANI, ALDO, M.D., M.R.C.P.—Brief note on the cultural characters of *Trichophyton balaneum* Cast., the cause of a pseudo-pityriasis capitis, 173
- CAWSTON, F. G., M.D.Cantab.—Case of bilharzia disease complicated by stone, cured by tartar emetic treatment, 174
- CAWSTON, F. G., M.D.Cantab.—Insanitary snails at Durban during the winter months, 189
- CHALMERS, ALBERT J., M.D., F.R.C.S., D.P.H., and PEKKOLA, WAINO.—*Dicercomonas soudanensis*, 29
- CHALMERS, ALBERT J., M.D., F.R.C.S., D.P.H., and ARCHIBALD, Major R. G., M.B., D.S.O., R.A.M.C.—A peculiar group of the *Coccaceæ*, 48
- CHALMERS, ALBERT J., M.D., F.R.C.S., D.P.H., and MARSHALL, ALEXANDER.—*Trichophyton Currii*, 83
- CHALMERS, ALBERT J., M.D., F.R.C.S., D.P.H., and INNES, Capt. ARTHUR, R.A.M.C.(T.).—Sudanese examples of two common hyperkeratoses, 97
- CHALMERS, ALBERT J., M.D., F.R.C.S., D.P.H., and MARSHALL, ALEXANDER.—Edema of the eyelids caused by ants, 117
- CHALMERS, ALBERT J., M.D., F.R.C.S., D.P.H., and INNES, Capt. ARTHUR, R.A.M.C.(T.).—Lichen scrofulosorum in the Sudan, 153
- CHALMERS, ALBERT J., M.D., F.R.C.S., D.P.H., and PEKKOLA, WAINO.—*Diplocercomonas soudanensis*, 190
- CHALMERS, ALBERT J., M.D., F.R.C.S., D.P.H., and ARCHIBALD, Major R. G., D.S.O., M.D., R.A.M.C.—Quinine metrorrhagia, 191
- CHRISTOPHERSON, J. B., M.A., M.D., F.R.C.P., F.R.C.S.—The cure of bilharzia disease by the intravenous injections of antimony tartrate, 113
- CHRISTOPHERSON, J. B., M.A., M.D.Cantab., F.R.C.P.Lond., F.R.C.S.Eng.—Laboratory and other notes on seventy cases of bilharzia treated at the Khartoum Civil Hospital by intravenous injections of antimony tartrate, 129
- CHRISTOPHERSON, J. B., M.A., M.D., F.R.C.P., F.R.C.S.—The cure of bilharzia disease by the intravenous injection of antimony, 197
- CLELAND, J. B., M.D., Cb.M.(Syd.).—The occurrence of carcinoma in the liver of a leper and of squamous epithelioma with tuberculosis in a cow, 147
- CLELAND, J. BURTON, M.D.—"Boomerang" leg, 165
- CONNAL, A., M.D.—Some notes on the treatment of leprosy, 37
- DELMEGE, JAMES A., M.R.C.S., L.R.C.P., D.P.H.—Some practical notes on the prevention of mosquito breeding, 181
- HOWARD, ROBERT, M.D.—A note on quinine administration, 2
- INNES, Major ARTHUR, R.A.M.C.(T.), and ARCHIBALD, Major R. G., M.B., D.S.O., R.A.M.C.—Clinical and pathological notes on a fatal case of bilharzia treated by tartar emetic, 53
- INNES, Major ARTHUR, R.A.M.C.(T.), and CHALMERS, ALBERT J., M.D., F.R.C.S., D.P.H.—Sudanese examples of two common hyperkeratoses, 97
- INNES, Major ARTHUR, R.A.M.C.(T.), and CHALMERS, ALBERT J., M.D., F.R.C.S., D.P.H.—Lichen scrofulosorum in the Sudan, 153
- LOUGHNAN, Major W. F. M., M.C., L.R.C.P. & S.I., D.P.H., D.T.M. & H.Camb.—Seven-day fever, 114
- LOW, GEORGE C., M.A., M.D., C.M., M.R.C.P.—Case of bilharzial disease treated by intravenous injections of antimonium tartaratum, 93
- MCAUGHTON, J. G.—Notes on filarial infections in the Gilbert and Ellice islands, 1
- MARSHALL, ALEXANDER and CHALMERS, ALBERT J., M.D., F.R.C.S., D.P.H.—*Trichophyton currii*, 83
- MARSHALL, ALEXANDER, and CHALMERS, ALBERT J., M.D., F.R.C.S., D.P.H.—Edema of the eyelids caused by ants, 117
- MASTERS, WALTER E., M.D., M.R.C.S., L.R.C.P.—A model mining village in the Tropics, 89
- MASTERS, WALTER E., M.D., M.R.C.S., L.R.C.P.—The ætiology of blackwater fever, 146
- MASTERS, WALTER E., M.D., M.R.C.S.—Some notes on cases of interest from Prestea, Gold Coast, 221
- MOORE, ALFRED, M.D., D.T.M. & H.Cantab.—A simple method of mounting and preserving insects, &c., 206
- NEWLOVE, J. R., and CHRISTOPHERSON, J. B., M.A., M.D.Cantab., F.R.C.P.Lond., F.R.C.S.Eng.—Laboratory and other notes on seventy cases of bilharzia treated at the Khartoum Civil Hospital by intravenous injections of antimony tartrate, 129
- NICHOLLS, LUCIUS, M.D., B.C., B.A.Cantab.—The etiology of sprue, pellagra and scurvy, 21
- O'CONNELL, MATHEW D., M.D.—The rigor of malarial fever, 55

- O'CONNOR, P. W., M.R.C.S., L.R.C.P., D.T.M. & H.Camb.
—Helminthic ova in human stools, 166
- PEKKOLA, WAINO, and CHALMERS, ALBERT J., M.D., F.R.C.S.,
D.P.H.—*Dicercomonas soudanensis*, 29
- PEKKOLA, WAINO, and CHALMERS, ALBERT J., M.D., F.R.C.S.,
D.P.H.—*Diplocercomonas soudanensis*, 190
- ROSE, F. G.—Enteric fever and prophylactic inoculation in
British Guiana, 229
- ROSE, F. G., M.B. Cantab., M.R.C.S.—Short note on the
results of vaccine treatment in malarial lymphangitis
in British Guiana, 81
- TAYLOR, FRANK E., M.D., M.R.C.P., and CASTELLANI, ALDO,
M.D., M.R.C.P.—Case of pentosuria contracted in the
Tropics, 121
- WALLER, H. W. L., M.B., Ch.B. Liverp.—Case of acute
appendicitis in a native of Africa, 1
- WATT, JAMES C., M.B.—Remarks on dysentery in East
Africa, 45
- WILLIAMS, J. P., M.R.C.S., L.R.C.P.—Blackwater fever,
145
- YOUNG, W. A., M.B., Ch.B., D.T.M.—Common diseases
seen in British hospitals as seen in Sierra Leone, 9
-

GENERAL INDEX.

A

Abdominal section, purgation before and after, 80

ABSTRACTS:—

- Bilharziasis: its incidence and eradication. By Mrs. B. Sheldon Elgood and Thomas Cherry, 202
 — treated by intravenous injections of antimonium tartaratum. By George C. Low and H. B. G. Newham, 216
 Blindness in India, 232
 Contribution to the etiology of yellow fever. By H. Noguchi, M.D., 66
 Dengue at Saint Thomas. By F. F. Lane, 28
 "Desert," septic, or veldt sore amongst European troops. By Colin McK. Craig, 194
 Enteric fever and prophylactic inoculation in British Guiana. By F. G. Rose, 229
 Genital defects and venereal diseases among the Porto Rican draft troops. By H. Goodman, 150, 152
 Hookworm infection among troops, 80
 Intravenous injections of antimonium tartaratum (tartar emetic) in bilharziasis. By Frank E. Taylor, M.D., M.Sc., F.R.C.S., D.P.H., 170
 Malaria during the war. By G. Paiseau, 125
 More milk for vitamins, 7
 Pathogenesis of deficiency diseases and pellagra. By P. Rondoni, 110
 Prevention of scurvy by malt, to be found in Captain Cook's account of his voyage, 175
 Primary toxic effect of neo-salvarsan. By Prof. K. Petré, 169
 Public health in Egypt, 32
 Recognition of tropical sprue in the United States. By Edward J. Wood, 178
 Reduction of body weight in war time, 8
 Relation of forage poisoning to botulism, 188
 Sanitary aspects of warfare in South-Eastern Europe. By Prof. W. J. R. Simpson, C.M.G., M.D., 58
 Scurvy and constipation, 88
 Study of the diet of non-pellagrous and of pellagrous households. By J. Goldberger and others, 6
 "Vitamine" hypothesis and the diseases referable to faulty diet. By E. V. McCollum, 17
 Yellow fever By Hideyo Noguchi, 187

- Acquired cranial deformity, an (illustrated), 122
 Adrenalin injection in latent malaria, provocative, 76
 Ailments, tropical, and their prevention: a course of instruction for the public, 15
 Air, change of, 148
 Alcohol: effect in tropical countries: prohibition: use of alcohol in influenza, 25
 Amoebæ, the, living in man, 200
 Amoebic dysentery, myristica (nutmeg) in the treatment of, 79
 — liver abscess, 198
 Angina pectoris and syphilis, 200

ANNOTATIONS:—

- Action of pathologic serum on photochemical processes, 27
 Acute paralysis after vaccination against typhoid, 198
 American trypanosomiasis or Chagas' disease in Venezuela, 229
 Amoebic liver abscess, 198
 — tumours in large intestine, 117
 Angina pectoris and syphilis, 209
 Anthrax vaccine in treatment of leprosy, 14
 Antiscorbutics, 186

ANNOTATIONS (continued).

- A preliminary note on the insect transmitting *Leptomonas davidi*, 229
 Association of rickettsia with trench fever, 94
 Atropin test for paroxysmal tachycardia, 27
 Autogenous serum therapy of small-pox, 201
 Blackwater fever, 80
 Blood pressure in malaria, 76
 Case of viper poisoning, 184
 Causal factors of cirrhosis of the liver, 27
 Complications of Malta fever, 27
 Contagious jaundice with spirochaetes and symptoms suggesting blackwater fever, 79
 — lymphangitis in horses, 123
 Dangers of chenopodium treatment of uncinariasis, 6
 Dysentery and œdema, 191
 Fatal cases of pernicious malaria with massing of *Plasmodium falciparum* in cerebral capillaries, 201
 Gallstones in the East Indies, 79
 Gangrene from malaria, 209
 Haemorrhagic bronchitis, 215
 Hexamine by the vein in spirochaetosis, 117
 Human rabies, 193
 Importation of liquid eggs from China, 120
 Inherited and familial exophthalmic goitre, 191
 Intermittent chyluria with malaria, 120
 Intestinal schistosomiasis, 123
 Kidney symptoms in prisoners of war, 216
 Lelshmaniasis of skin and mucosae, 119
 Leprosy at Marseilles, 110
 — in Northern Brazil, 178
 London School of Tropical Medicine, School dinner, 203
 Lymphocytosis in soldiers, 194
 Malaria in Algiers—difficulty of diagnosis when resembling typhoid, 228
 — in Cuba, 201
 Malarial infection and control, 193
 — pleurisy and peritonitis, 194
 Mental disease in Japan, 186
 Myeloid leukemia with nervous complications, 201
 Myristica (nutmeg) in the treatment of amoebic dysentery, 79
 Note on Castellani's broncho-spirochaetosis, 216
 Observations on scurvy, 30
 Pellagra, 14
 Perforation of echinococcus cyst, 52
 Primary echinococcus cyst of the uterus, 52
 Provocative adrenalin injection in latent malaria, 76
 Pseudo-malignant disease of the stomach, 229
 Pulmonary sporotrichosis, 6
 Purgation before and after abdominal section, 80
 Rabies in North Brazil, 172
 Recent publications on broncho-spirochaetosis: la spirochètose broncho-pulmonaire à Toulon, par le Doct. Henri Chatrioux. *Thèse de Bordeaux, Imprimerie de l'Université*, 1919, 216
 Rôle of ascariasis in gall-bladder disease, 4
 Sand-fly fever and dengue, 180
 Schistosomiasis associated with uncinariasis, 86
 Separation of trypanosomes from blood in antigen preparation, 20
 Spread and incidence of intestinal protozoal infection in the population of Great Britain, 57
 Studies in the treatment of malaria, 68
 Suprarenal apoplexy, 80
 The action of a combination of atoxyl, tartar emetic and trypanosan on the *Trypanosoma congolense*, 229
 The first two cases of Castellani's broncho-spirochaetosis in the eastern districts of France, 213

ANNOTATIONS (continued).

- The toxicity of hydrochloride of emetine in man, 226
 Treatment of human beriberi with autolysed yeast extract, 194
 — of influenza in Burma, 28
 — of yaws, 167
 University of Tasmania, the, 159
 Vaccines in cholera prophylaxis, 188
 Varioform hemorrhagic rash in pneumonia, 79
 Vesical calculus of unusual size, 94
- Antigen preparation, separation of trypanosomes from blood in, 20
 Antimonium tartaratum (tartar emetic) in bilharziasis, intravenous injections of, 170
 Antiscorbutics, 186
 Apoplexy, suprarenal, 80
 Appendicitis in a native of Africa, case of acute, 1
 Ascariasis in gall-bladder disease, rôle of, 4
 Autogenous serum therapy of small-pox, 201

B

- Bilharzia disease, case of, complicated by stone, cured by tartar emetic treatment, 174
 —, the cure of, by the intravenous injection of antimony, 197
 — — — — — injections of antimony tartrate, 114
 — — — — —, a case of, treated by intravenous injections of antimonium tartaratum, 93
 Bilharziosis: its incidence and eradication, 202
 — treated by intravenous injections of antimonium tartaratum, 216
 Blackwater fever, 80, 145
 — — — — —, contagious jaundice with spirochaetes and symptoms suggesting, 79
 — — — — —, the aetiology of, 146
 Body weight, reduction of, in war time, 8
 "Boomerang" leg, 165
 "Bosch-yaws," the dermal leishmaniasis of Dutch Guiana, a few notes on, 122
 Botulism, the relation of forage poisoning to, 188
 Brain, amoebic abscess of the: with notes on a case following amoebic abscess of the liver, 74
 Brief note on the cultural characters of *Trichophyton balcanicum* Cast., the cause of a pseudo-pityriasis capitis (illustrated), 173
 Bronchitis, Castellani's, 214
 — — — — —, hemorrhagic, 215
 Broncho-spirochaetosis, a case of (Castellani's bronchitis), 214
 — — — — —, recent publications on; la spirochètose broncho-pulmonaire à Toulon, 216
 Burma, treatment of influenza in, 28

C

- Case of acute appendicitis in a native of Africa, 1
 Castellani's broncho-spirochaetosis in the eastern districts of France, the first two cases of, 213
 — — — — —, note on, 216
 Chenopodium treatment of uncinariasis, dangers of, 6
 Childbirth, painless, in twilight sleep in the East, 169
 China, importation of liquid eggs from, 120
 Cholera prophylaxis, vaccines in, 188
 Chyluria, intermittent, with malaria, 120
 Cirrhosis of the liver, causal factors of, 27
 Civil medical profession, organizing the, on Army lines, 40
Coccacia, a peculiar group of the, 48
 Committee of Inquiry, Colonial Medical Services, 206
- CORRESPONDENCE, 212
- Cuba, malaria in, 201

D

- Daylight saving, 56
 Deep breathing, the science and art of, as a prophylactic and therapeutic aid in consumption, 68
 Deficiency disease and pellagra, pathogenesis of, 110

- Dengue, sand-fly fever and, 180
 "Desert," septic or yeldt sore amongst European troops, 194
 Diabetes and its diabetic treatment, 172
 Diagnosis, faulty, 118
Dicercomonas soudanensis (illustrated), 29
 Diet, study of the, of non-pellagrous and of pellagrous households, 6
 Dietetic preparation, 96
 Dinner of London School of Tropical Medicine, 203
Diploecomonas soudanensis, 190
 Diseases referable to faulty diet, the "vitamine" hypothesis and the, 17
 Doctors' work at home after retiring from the tropics, 191
 Durban, insanitary snails at, during the winter months, 189
 Dysentery and oedema, 191
 — in East Africa, remarks on (illustrated), 45

E

- East African industry, an interesting, 2
 — — — — — Indies, gallstones in, 79
Echinococcus cyst, perforation of, 52
 Egypt, public health in, 32
 Erratum, 16
 Euphorbia and leprosy, 120
 Exophthalmic goitre, inherited and familial, 191
 Eyelids, oedema of the, caused by ants (illustrated), 117

F

- Fatal case of bilharzia treated by tartar emetic, clinical and pathological notes on a (illustrated), 53
 Filarial infections, notes on, in the Gilbert and Ellice islands, 1
 Floating (travelling) school of tropical medicine, an inter-allied, 123

G

- Genital defects and venereal disease among the Porto Rican draft troops, 150, 152

H

- High standing, a layman of, as chairman, 94
 Hong-Kong, report on the investigations of the outbreak of epidemic meningitis in, 34, 43, 66
 — — — — —, University of, 77
 How soon may a patient invalided from dysentery be considered fit to return to the tropics, 207
 Human beri-beri, treatment of, with autolysed yeast extract, 194
 — — — — — stools, helminthic ova in, 166

I

ILLUSTRATIONS:—

- Etiology of sprue, pellagra, and scurvy (2 diagrams), 21
Dicercomonas soudanensis (diagram), 30
 Remarks on dysentery in East Africa (diagram), 46
 The sanitary aspects of warfare in South-eastern Europe, 63, 64, 65
Trichophyton currii, 84
 A model mining village in the tropics:—
 Prestea model mining village, Gold Coast, 89
 Native wash-houses and windmill pump, 90
 Main avenue showing rail track leading to incinerator, 90
 Ground diagram of native latrine, 91
 A group of the natives, 92
 Seven-day fever (3 charts), 115
 An acquired cranial deformity, 122
 Brief note on the cultural characters of *Trichophyton balcanicum* Cast., the cause of a pseudo-pityriasis capitis, 173; hanging-drop culture, 174

ILLUSTRATIONS (continued).

- Some notes on cases of interest from Prestea, Gold Coast (18 figures), 221-226
 Some practical notes on the prevention of mosquito breeding (7 figures), 181, 182, 183
 Infection, malarial, and control, 193
 — the, of their young by trypanosome infected mothers (illustrated), 198
 Insects, a simple method of mounting and preserving (illustrated), 206
 Intestinal protozoal infection, spread and incidence of, in the population of Great Britain, 57

J

- Japan, mental diseases in, 186

L

- Large intestine, amœbic tumours in, 117
 Lassitude, tropical and ennui, 176

LEADING ARTICLES:—

- A layman of high standing as chairman, 94
 Alcohol: effect in tropical countries: prohibition: use of alcohol in influenza, 25
 An inter-allied floating (travelling) school of tropical medicine, 123
 Castellani's bronchitis, 214
 Change of air, 148
 Daylight saving, 56
 Faulty diagnosis, 118
 "First-aid" in tropical ailments, 51
 Hospital ships in time of peace, 168
 How soon may a patient invalidated from dysentery be considered fit to return to the tropics? 207
 Leave, leisure and after, 191
 London School of Tropical Medicine, 31
 Lunacy in tropical countries, 184
 Organizing the civil medical profession on army lines, 40
 The years 1914-1918 in their medical aspects, 4
 The future of West Africa, 107
 The war and its effects on tropical medicine and hygiene, 159
 The young surgeon in the Tropics, 227
 Tropical ailments and their prevention: a course of instruction for the public, 15
 Tropical lassitude and ennui, 176
 University of Hong-Kong, 77
 What can meteorologists do to help epidemiologists? 84
 When to return to the tropics after being invalidated from malaria, 199
 Le cholera, 172
 Leprosy, some notes on the treatment of, 37
 Lymphocytosis in soldiers, 194

M

- Malaria and its treatment in the line and at the base, 67
 —, blood-pressure in, 76
 —, during the war, 125
 —, gangrene from, 209
 —, studies in the treatment of, 68
 Malarial fever, the rigor of, 55
 Malta fever, complications of, 27
 Marseilles, leprosy at, 110
 Medicine, the London School of Tropical, 31
 Mining villages in the tropics, a model (illustrated), 89
 Mosquito breeding, some practical notes on the prevention of (illustrated), 181

N

- Neo-salvarsan, primary toxic effect of, 169
 North Brazil, rabies in, 172
 Northern Brazil, leprosy in, 178

- Note on quinine administration, 2
 NOTES AND NEWS, 27, 28, 44, 50, 68, 79, 107, 148, 159, 178
 Colonial Medical Services, Committee of Inquiry, 206
 Dietetic preparation, 96
 Interesting East African industry, An, 20
 Pneumonic plague in China, 28
 Notes on filarial infections in the Gilbert and Ellice islands, 1

O

- Occurrence, the, of carcinoma in the livers of a leper and of squamous epithelioma with tuberculosis in a cow, 147

ORIGINAL COMMUNICATIONS:—

- Ætiology of blackwater fever. By Walter E. Masters, M.D., M.R.C.S., 146
 A few notes on "hoshch-yaws," the dermal leishmaniasis of Dutch Guiana. By E. Bonne, 122
 Amœbic abscess of the brain: with notes on a case following amœbic abscess of the liver. By Captain F. L. Armitage, 69
 A model mining village in the tropics. By Walter E. Masters, M.D., M.R.C.S., L.R.C.P. (illustrated), 90
 A peculiar group of the Coccaceæ. By A. J. Chalmers, M.D., F.R.C.S., D.P.H., and Major R. G. Archibald, M.B., D.S.O., R.A.M.C., 48
 Blackwater fever. By J. P. Williams, M.R.C.S., L.R.C.P., 145
 "Boomerang" leg. By J. Burton Cleland, M.D., 165
 Brief notes on the cultural characters of *Trichophyton balcanicum* Cast., the cause of a pseudo-pityriasis capitis. By Aldo Castellani, M.D., M.R.C.P. (illustrated), 173
 Case of acute appendicitis in a native of Africa. By N. W. L. Waller, M.B., Ch.B. Liverp., 1
 Case of bilharzia disease complicated by stone, cured by tartar emetic treatment. By F. G. Cawston, M.D. Cantab., 174
 Case of bilharzial disease treated by intravenous injections of antimonium tartaratum. By George C. Low, M.A., M.D., C.M., M.R.C.P., 93
 Cure of bilharzia disease by the intravenous injections of antimony tartrate. By J. B. Christopherson, M.A., M.D., F.R.C.P., F.R.C.S., 113
 Case of broncho-spirochaetosis (Castellani's bronchitis). By Major W. Bronghton-Alcock, R.A.M.C., 214
 Case of pentosuria contracted in the tropics. By Aldo Castellani, M.D., M.R.C.P., and Frank E. Taylor, M.D., M.R.C.P. (illustrated), 122
 Case of sprue associated with tetany. By P. W. Bassett-Smith, C.B., C.M.G., R.N., F.R.C.P., F.R.C.S., D.T.M. and H., 24
 Clinical and pathological notes on a fatal case of bilharzia treated by tartar emetic. By Major R. G. Archibald, M.B., D.S.O., R.A.M.C., and Major Arthur Iunes, R.A.M.C.(T.) (illustrated), 53
 Common diseases seen in British hospitals as seen in Sierra Leone. By W. A. Young, M.B., Ch.B., D.T.M., 9
 Cure of bilharzia disease by the intravenous injection of antimony. By J. Christopherson, M.A., M.D., F.R.C.P., F.R.C.S., 197
Dicrocoelomonas soudanensis. By A. J. Chalmers, M.D., F.R.C.S., D.P.H., and Wainö Pekkola (illustrated), 30
Diplocoelomonas soudanensis. By A. J. Chalmers, M.D., F.R.C.S., D.P.H., and Wainö Pekkola, 190
 Epithelial xerosis of the conjunctiva in natives of the Sudan. By Major R. G. Archibald, M.B., D.S.O., R.A.M.C. (illustrated), 82
 Etiology of sprue, pellagra, and scurvy. By Lucius Nicholls, M.D., B.C., B.A. Cantab. (illustrated), 21
 Euphorbia and leprosy. By F.R.G.S.,

ORIGINAL COMMUNICATIONS (continued).

- Helminthic ova in human stools. By P. W. O'Connor, M.R.C.S., L.R.C.P., D.T.M. and H. (Camb.), 166
- Infection of their young by trypanosome-infected mothers. By P. W. Bassett-Smith, C.B., C.M.G., F.R.C.P., F.R.C.S. (illustrated), 198
- Insanitary snails at Durban during the winter months. By F. G. Cawston, M.D. Cantab., 189
- Laboratory and other notes on seventy cases of bilharzia treated at the Khartoum civil hospital by intravenous injections of antimony tartrate. By J. B. Christopherson, M.A., M.D. Cantab., F.R.C.P. Lond., F.R.C.S. Eng., and J. R. Newlove (illustrated), 129
- Lichen scrofulosorum* in the Sudan. By A. J. Chalmers, M.D., F.R.C.S., D.P.H., and Captain Arthur Innes, R.A.M.C. (T.) (illustrated), 153
- Note on "quinine" administration. By Robert Howard, M.D., 2
- Notes on filarial infections in the Gilbert and Ellice islands. By J. G. McNaughton, 1
- Oedema of the eyelids caused by ants. By A. J. Chalmers, M.D., F.R.C.S., D.P.H., and Alexander Marshall (illustrated), 117
- Quinine metrorrhagia. By A. J. Chalmers, M.D., F.R.C.S., D.P.H., and Major R. G. Archibald, D.S.O., M.D., R.A.M.C., 191
- Remarks on dysentery in East Africa. By James C. Watt, M.B. (illustrated), 45
- Rigor of malarial fever. By Mathew D. O'Connell, M.D., 55
- Seven-day fever. By Major W. F. M. Loughnan, M.C., L.R.C.P. and S.I., D.P.H., D.T.M. and H. Camb. (illustrated), 114
- Short note on the results of vaccine treatment in filarial lymphangitis in British Guiana. By F. G. Rose, M.B. Cantab., M.R.C.S., 82
- Simple method of mounting and preserving insects, &c. By Alfred Moore, M.D., D.T.M. and H. Cantab. (illustrated), 205
- Some notes on cases of interest from Preteza, Gold Coast. By Walter E. Masters, M.D., M.R.C.S. (illustrated), 221
- Some notes on the treatment of leprosy. By A. Connal, M.D., 37
- Some practical notes on the prevention of mosquito breeding. By James A. Delmege, M.R.C.S., L.R.C.P., D.P.H. (illustrated), 181
- Sudanese examples of two common hyperkeratoses. By A. J. Chalmers, M.D., F.R.C.S., D.P.H., and Captain Arthur Innes, R.A.M.C. (T.) (illustrated), 97
- The occurrence of carcinoma in the liver of a leper and of squamous epithelioma with tuberculosis in a cow. By J. B. Cleland, M.D., Ch.M. (Syd.), 147
- Trichophyton currii*. By A. J. Chalmers, M.D., F.R.C.S., D.P.H., and Alexander Marshall (illustrated), 83

P

- Paroxysmal tachycardia, atropin test for, 27
- Pathological serum, action of, on photochemical processes, 27
- Peace, hospital ships in time of, 168
- Pentosturia contracted in the tropics, a case of, 121
- Pellagra, 14
- Pernicious malaria, fatal cases of, with massing of *Plasmodium falciparum* in cerebral capillaries, 201
- Pleurisy, malarial, and peritonitis, 194
- Pneumonia, varioli form hemorrhagic rash in, 79
- Pneumonic plague in China, 28
- Prevention of scurvy by malt, to be found in Captain Cook's account of his voyage, 175
- Prisoners of war, kidney symptoms in, 216
- Pulmonary sporotrichosis, 6

Q

- Quinine administration, note on, 2
- metrorrhagia, 191

R

- Rabies, human, 193
- Report on the investigations of the outbreak of epidemic meningitis in Hong-Kong, by First Lieutenant Peter K. Olitsky, of the Rockefeller Institute for Medical Research, New York, 34, 43, 66

REVIEWS:—

- Amoebæ, the, living in man: a zoological monograph (Dobell), 209
- Catalogue of Lewis's medical and scientific (Otabe) circulating library, 88
- Diabetes and its diabetic treatment (Basu), 172
- Elements of surgical diagnosis (Gould), 96
- Fevers in the tropics (Rogers), 144
- Le cholera (Violle), 172
- Malaria and its treatment in the line and at the base (Alport), 67
- Painless childbirth in twilight sleep in the East (Webb-Johnson), 169
- Practical vaccine treatment for the general practitioner (Allen), 164
- The science and art of deep breathing as a prophylactic and therapeutic agent in consumption, 68
- Trench fever (Byam), 164
- Urethroscope, the, in the diagnosis and treatment of urethritis (Lumb), 172

S

- Saint Thomas, dengue at, 28
- Scurvy and constipation, 88
- , observations on, 30
- Seven-day fever (illustrated), 114
- Seventy cases of bilharzia treated at the Khartoum civil hospital by intravenous injections of antimony tartrate, laboratory and other notes on (illustrated), 129
- Sierra Leone, common diseases seen in British hospitals, as seen in, 9
- Skin and mucosæ, leishmaniasis of, 119
- Spirochaetosis, hexamine by the vein in, 117
- Sprue, pellagra and scurvy, the etiology of (illustrated), 21
- Sudan, epithelial xerosis of the conjunctiva in natives of the (illustrated), 81
- , *Lichen scrofulosorum* in the (illustrated), 153
- Surgical diagnosis, elements of, 96

T

- Tasmania, the University of, 159
- Tetany, a case of sprue, associated with, 24
- Treatment of leprosy, anthrax vaccine in, 14
- Trench fever, 164
- , association of rickettsia with, 94
- Trichophyton currii* (illustrated), 83
- Troops, hookworm infection among, 80
- Tropical ailments, "first-aid" in, 51
- countries, lunacy in, 184
- sprue in the United States, the recognition of, 178
- Tropics, when to return to, after being invalided from malaria, 199
- Two common hyperkeratoses, Sudanese examples of (illustrated), 97

U

- Uncinariasis, schistosomiasis associated with, 86
- Urethroscope in the diagnosis and treatment of urethritis, 172
- Uterus, primary echinococcus syst of the, 52

V

- Vaccination against typhoid, acute paralysis after, 198
- Vaccine treatment in filarial lymphangitis in British Guiana, a short note on the results of, 81
- , practical, for the general practitioner, 164

Vesical calculus of unusual size, 94
Viper poisoning, case of, 184
Vitamines, more milk for, 7

W

War, the, and its effects on tropical medicine and hygiene, 159
Warfare in South-eastern Europe, the sanitary aspects of (illustrated), 58

West Africa, the future of, 107
What can meteorologists do to help epidemiologists, 84

Y

Yaws, treatment of, 167
Years 1914-1918, the, in their medical aspects, 4
Yellow fever, 187
—— —, contribution to the etiology of, 66

LIST OF PLATES.

- A simple method of mounting and preserving insects, 206
 Clinical and pathological notes on a fatal case of hilharzia treated by tartar emetic, 55
Diceromonas soudanensis, 29
 Epithelial xerosis of the conjunctiva in natives of the Sudan, 83
 Infection of their young by trypanosome-infected mothers. Unhorn rat, mother dead from infection of *T. rhodesiensis*, 198
 Laboratory and other notes on seventy cases of hilharzia treated at the Khartoum civil hospital by intravenous injections of antimony tartrate, 132
 Lichen scrofulosorum in the Sudan, Plates I, II, 158
 Edema of the eyelids caused by ants, 117
 Sudanese examples of two common hyperkeratoses, Plates I, II, III, IV, 104

INDEX OF SELECTIONS FROM COLONIAL MEDICAL REPORTS.*

GENERAL INDEX.

- (88) St. Lucia (*continued*), 1
 (89) Trinidad and Tohago, 1916—3, 5, 9, 13, 17
 (90) Queensland, 1917—21, 25, 29, 33
 (91) St. Vincent, 1916-17—34, 37
 (92) Falkland Islands, 1917—41
 (93) Jamaica, 1917—41, 45, 49
 (94) Makogai, 55, 57
 (95) Patna Lunatic Asylum, 1915-17—58
 (96) Bihar and Orissa, 1917—61
 (97) Trinidad and Tohago, 1917 (Medical Inspector of Health), 62, 65
 (98) Trinidad and Tobago, 1917 (Surgeon-General), 68, 69, 73
 (99) Khartoum and Omdurman, 1917—74, 77, 81
 (100) Bengal Lunatic Asylums, 1915-17—81
 (101) Bengal Hospitals and Dispensaries, 1917—83
 (102) British Guiana, 1917—85, 89, 93
 (103) Seychelles, 1917—93

* Note to Binder.—These are to be bound to follow the last number in the volume of the JOURNAL OF TROPICAL MEDICINE AND HYGIENE.

Original Communications.

A CASE OF ACUTE APPENDICITIS IN A NATIVE OF AFRICA.

By H. W. L. WALLER, M.B., Ch.B. Liverp.
Surgeon to the Government Hospital, Zanzibar.

ACUTE appendicitis in an African native, if not unknown, is, I believe, exceedingly rare. The following case may, therefore, prove of interest. A healthy, young, nulliparous woman, aged about 23, presented herself in November, 1916, complaining of a swelling and some pain in the right side of the pelvis. She had noticed it for about two months, had observed that it was getting larger, and there was a history of amenorrhœa during that time. External palpation was difficult owing to the well-developed and fatty condition of the abdominal wall, but a rounded, freely movable, very tender swelling in the region of the right ovary could be made out. This was confirmed by a vaginal examination, and the fact also noted that the uterus was somewhat enlarged. The diagnosis of either a small ovarian cyst or a tubal pregnancy was made. At the operation I removed a unicellular, thin-walled, pedunculated ovarian cyst about the size of a goose's egg. Before closing the wound it was ascertained that the adnexa of the left side and the appendix were healthy; the uterus was then seen to be somewhat enlarged and very firm in consistency. Her recovery was uneventful until seven days after the operation, when she aborted an ovum of about two and a half months. There were no other complications, and her subsequent health continued good until July of the present year, when she again came to me complaining of pain in the right hypogastric region well inside the middle of Poupart's ligament. She was admitted to hospital for observation, and remained there eight days before operation. Again the stoutness of the abdominal wall, together with some rigidity, frustrated a satisfactory external examination. *Per vaginam*, a tense, movable, tender swelling could be felt from the right lateral fornix, apparently in the region of and connected with the right ovary. Menstruation had occurred regularly up to within the previous fortnight, so that an ectopic gestation seemed unlikely. Immediately after admission to hospital the temperature rose on two consecutive evenings to 100° F. and 99.4° F. respectively; at all other times the temperature was normal. The rises of temperature were disregarded, and it was perhaps excusable, as in districts endemic to malaria, filariasis, and ankylostomiasis one has often to be content to attribute slight, irregular, and unaccountable pyrexia to one of these conditions, and one is apt not to take such ephemeral phenomena too seriously. On the whole it seemed probable that the condition was due to the presence of a parovarian or broad ligament cyst.

A mesial incision was made, when I found a large, thickened appendix, acutely inflamed, situated in the true pelvis, and densely adherent to the cæcum and surrounding structures. After some difficulty, owing to the denseness of the adhesions, the appendix was removed, but a considerable area to which it had been fixed was denuded of peritoneum; this was covered with Cargile membrane. Convalescence was uneventful, and she left hospital on the tenth day. The patient is a pure-blooded Swahili, living for the most part on native food. She is, however, a reliable and experienced ayah, and during her frequent engagements as nurse to European children she admits she indulges in European food. Indeed, at the time she was taken ill of her appendix she was acting as nurse in an English family, and receiving in the kitchen her due share of the food of the family.

NOTES ON FILARIAL INFECTIONS IN THE GILBERT AND ELLICE ISLANDS.

By J. G. McNAUGHTON.

(A) RESULTS OF THE TREATMENT OF FILARIASIS WITH SALVARSAN SUBSTITUTES.

In December, 1916, one case of elephantiasis of the leg was seen by me at Tarawa, in the Gilbert Islands. Filarial larvæ were abundant in the blood. I injected intramuscularly 20 cg. of galyol on two occasions at intervals of ten days. The patient was under observation till March, 1917, and had no attack of filarial fever. When he was sent back to his island in March I was unable to find filariæ in the blood. I visited his island in May, 1917, and examined the patient. He had had no attack of filarial fever. I was, unfortunately, unable to examine his blood at that time. In November, 1917, a Samoan was brought to Tarawa Hospital with elephantiasis of the scrotum. Filarial larvæ were abundant in blood slides examined.

Injections of 20 cg. of galyol were given intramuscularly on two occasions at intervals of seven days.

In December the scrotum was amputated, and at that time no filarial larvæ could be found in the blood, and in January, 1918, one injection of 20 cg. of galyol was given.

Till he left Tarawa in March no larvæ could be found in the blood, though repeatedly sought for. There were no attacks of fever.

In both these cases there was little or no possibility of reinfection. *Stegomyia fasciata* is very common in the Gilbert Islands, but as there is very little filariasis, very few of these mosquitoes are infected. The blood of the latter patient will be examined periodically, as often as I have an opportunity.

I still think, provided there is no reinfection, salvarsan or its substitutes will cure filariasis by killing the filarial larvæ. If, after treatment by

galy or other salvarsan substitutes, one can isolate the cases of filariasis, one will make progress in stamping out the disease. Such isolation, at least in the Ellice Islands, is impossible, as every native seems to be infected with filaria. Mosquitoes are very numerous. Anti-mosquito work, consisting of the cutting back of bush, filling up of swamps, and spraying of plantations, is being carried out in Funafuti, but it is very difficult to spray thoroughly the bases of the taro and pulaka plants, the situations most favoured as breeding places by the mosquitoes.

(B) PERCENTAGE OF THE POPULATION OF FUNAFUTI, ELLICE ISLANDS, HARBOURING MICROFILARIAE.

Funafuti is the chief island of the Ellice group, but its population numbers only 217. Some of the other islands have a larger population, and as mosquitoes are very numerous in all the islands except one, Nanomea, and as filariasis is common, presumably the percentage of natives affected in these islands is as great as in Funafuti.

I examined the blood of every inhabitant of Funafuti, and microfilariæ were found in every case. I also examined the blood of two white people who had been for five months resident here, and microfilariæ were present in both cases.

The blood of the hen, pig, and dog was also examined, and microfilariæ were present in each case.

I had the opportunity of examining the blood of a baby a few hours old in Funafuti. This gave the

only negative result obtained, but the infant had been kept under a mosquito-net from birth. The mother suffers from frequent attacks of filarial fever.

Of the 217 natives infected with microfilaria, 150 have had attacks of fever, but only eight suffer from elephantiasis, and all these are over 35 years of age.

I had the opportunity of examining the blood of eleven Ellice Islanders suffering from elephantiasis, and larvæ were present in every case. This is not surprising when the microfilaria is so universally present.

In Funafuti I was able to investigate the periodicity of filarial larvæ. I examined the blood of twelve natives six times in twenty-four hours at four-hourly intervals.

FILARIAL PERIODICITY IN FUNAFUTI, ELLICE ISLANDS.

No.	4 a.m.	8 a.m.	12 noon	4 p.m.	8 p.m.	12 midnight
1	...	3	...	3	...	2
2	...	2	3	...	2	1
3	3	4	...	...	2	1
4	3	5	...	2	1	2
5	4	8	5	5	5	2
6	2	2	6	8	6	4
7	3	4	6	8	6	2
8	5	9	5	8	6	4
9	4	7	8	10	7	4
10	2	9	9	7	6	4
11	7	13	7	7	13	3
12	6	8	7	5	8	4

Average 4 ... 6 ... 4.5 ... 5 ... 5 ... 2.5

Note.—Only one drop of blood was taken for each slide.

(C) CENSUS OF ELEPHANTIASIS IN THE ELLICE ISLANDS.

NUMBER OF CASES				PART AFFECTED							
Island	Population	Men	Women	Leg	Scrotum	Arm	A., L., and S.	A. and L.	Breast and L.	Percentage	
Vaitupu	587	19	16	28	6		1		—	6.1	
Funafuti	255	5	3	5	2			1	—	3.1	
Nakufetau	335	1						1	—	0.3	
Nukuleilei	170	5	2	2	2		2	—	1	4.1	
Nui	353	11	8	17	2					5.4	
Nuitao	616	8		2	2	1	3			1.3	
Nanomea	759	7	1	3	2			3		1.0	
Nanomaga	359	4		3				1		1.1	
		60	30								
Total	3,434	90		60	16	1	6	6	1	2.6	

90

A NOTE ON "QUININE" ADMINISTRATION.

By ROBERT HOWARD, M.D.

Most of the alkaloids of the British Pharmacopœia are used in such small doses that we have become accustomed to think of them almost entirely in terms of the alkaloid, and to ignore the acid radical with which it is combined to form a salt. With such drugs as atropine, strychnine, or pilocarpine, where the doses employed are minute, or even with morphine or emetin, where the maximum dose does not much exceed 1 gr. per diem, this neglect of the particular salt used is of no practical consequence; but surely it is otherwise in the case of quinine,

where doses up to 80 gr. or 90 gr. per diem have recently been advocated.

In Manson's "Tropical Diseases," in the chapter on the treatment of malaria, sixth edition, p. 123, there is a table showing the solubility and equivalent value of the salts of quinine, from which the following particulars are taken:—

Name of salt	Percentage of the alkaloid in the salt	Solubility in cold water
Hydrochloride	81.8	in 40 parts
Sulphate	73.5	" 800 "
Bihydrochloride	72.0	" 1 "
Hydrobromide	76.6	" 45 "
Bihydrobromide	60.0	" 7 "
Bisulphate	59.1	" 11 "

A cursory examination would seem to show that the two most suitable salts are the hydrochloride and the bihydrochloride.

The hydrochloride has much the highest percentage of alkaloid, and its solubility of 1 in 40 should be sufficient for ordinary routine work. The bihydrochloride, though containing less alkaloid, is on account of its extreme solubility obviously indicated for special purposes, e.g., intramuscular or intravenous injection, &c.

The sulphate is contra-indicated on account of its extreme insolubility, and the bisulphate on account of the relatively low percentage of alkaloid.

When I first went out to Central Africa in 1899, I determined to make the hydrochloride and bihydrochloride of quinine the basis of my treatment of malaria, and twenty years' experience in Zanzibar, Nyasaland, and German East Africa has only increased my satisfaction in the choice of these two salts. For routine prophylaxis I use the hydrochloride, either in tablet form or in solution, in which case I usually add one minim of acid hydrochlor. dil. to each grain of quinine, and so convert it into the bihydrochloride.

For the treatment of definite malarial pyrexia I use the bihydrochloride. This salt makes a very soft friable tablet, and is so soluble that even when it has been given in tablet form one can often observe definite evidence of its absorption in the occurrence of tinnitus aurium within an hour of its administration. If a patient is very susceptible to quinine and complains much of tinnitus, this may sometimes be decreased by giving a few minims of ac. hydrobrom. dil. at the same time as the quinine, but it would hardly seem worth while to keep a special hydrobromic salt for this purpose.

In discussing the treatment of malaria with fellow-practitioners, I have constantly been told that "the Government (or the military) authorities only supply us with sulphate or bisulphate, except for a little bihydrochloride, reserved for purposes of injection." Why has this choice been made? It would appear to be mainly a question of fashion. The sulphate is so insoluble, and it compresses into such a hard mass that it is notoriously almost useless to give it in tablet form, since such tablets pass in the faeces. This difficulty is met either by ordering the patient to chew up the tablet (an unpleasant process that he is prone to avoid), or by dissolving the sulphate in acid sulph. dil. If a large dose of this solution is given by the mouth it involves the administration of a considerable quantity of ac. sulph. dil. to a stomach already in an irritable condition owing to the malaria, and several writers have suggested this as a cause of some of the indigestion and vomiting that is often attributed to the use of quinine.

That the question of the relative percentage of alkaloid cannot be lightly dismissed is emphasized by reflecting that if, say, 50 gr. of quinine hydrochloride is administered the patient receives nearly 41 gr. of the alkaloid, whereas if the bisulphate is

given he receives only 29½ gr., and yet in the discussions on the treatment of malaria the assumption is often made that one salt is as effective as another. The ideal method of recording the treatment of cases of malaria would be a statement of the number of grains of alkaloid of quinine contained in the preparation which has been administered.

The question of expense is often urged, but the cost of manufacture of quinine hydrochloride need be very little, if any greater, than that of the sulphate. The slightly higher price of the hydrochloride is mainly due to its greater alkaloid content, and hence, though slightly more expensive, it is actually the more economical salt for practical use.

The bihydrochloride is more difficult to manufacture, and for that reason will always be slightly more expensive than the other salts discussed here.

Lastly, there is one group of cases which, as far as my experience in tropical Africa goes, requires special treatment. I refer to native babies. It has often been demonstrated by estimate of the splenic index, and also of the parasite rate, that in the more malarial districts the babies are in a state of chronic malaria and urgently need treatment. Such patients are brought to the dispensary tied on their mothers' backs. They are still being suckled if under eighteen months of age, they are frightened of the white doctor, and their mothers entirely decline to be parted from them and to leave them in hospital. Under these circumstances the desideratum is a simple, not unpleasant form of treatment which the mothers will consent to continue at home. The negro baby's capacity for spitting out any mixture that it considers nasty, or, if forced after a struggle to swallow it, of vomiting it immediately is simply amazing, and I have not found any form of quinine in solution satisfactory. The tannate of quinine is a practically tasteless salt. It is in the form of a gritty powder, and if a baby, after having had some put in its mouth, is immediately given the breast, it generally swallows the dose satisfactorily. Also, as far as my experience goes, if the African mother is given a number of such powders she will generally continue the administration at home. The tannate is far from an ideal salt. It is very insoluble, but it is said to be absorbed by the digestive juices, and it contains (according to Squire's Extra Pharmacopœia) only about 30 per cent. of alkaloid. For this reason the dose as ordinarily calculated must be at least doubled, and I reckon to give a baby of one year old 2 to 3 gr. for each dose. It is, however, easy to administer quinine in the manner I have described, and it has proved effective; and what perhaps is more important, it has appealed to the native mothers.

Quinine ethyl carbonate (equinine) may be used in the same way, but its very high cost rules it out of ordinary native practice, and its soft, silky, light crystals make it difficult to swallow. I have tried with some success one other form of quinine, viz., the pure alkaloid (quinine pur præcip.). This is

almost insoluble in water, and therefore fairly tasteless, but it is said to be dissolved in the stomach and intestines (*vide Tropical Diseases Bulletin*, vol. ii, p. 324). It is a damp, sticky powder, and for this reason difficult to administer. Of course, it has to be given in much smaller doses, viz., half or one-third of that used for the tannate. Possibly if combined with some indifferent powder as a vehicle it might be easier to swallow, and further experiments in this direction, and an exact determination of its rate and method of absorption, might prove fruitful.

CONCLUSIONS.

(1) For routine quinine administration in malarious districts the most suitable salts appear to be the hydrochloride and the bihydrochloride, and it seems unfortunate that these valuable preparations have been comparatively little employed, while the fashion has set in favour of the use of the sulphate and bisulphate.

(2) In the treatment of native infants who are suffering from malaria, the tannate of quinine given as a powder in relatively large doses has proved satisfactory.

(3) Possibly the pure alkaloid of quinine presents some advantages for oral administration, but further investigation is required, more particularly as to the method of its absorption.

Role of Ascariasis in Gall-bladder Disease (Aviles, Surgery, Gynaecology and Obstetrics, November).—A woman for twenty-six years had suffered from attacks of colic-like pain over the right upper quadrant of the abdomen, and occasionally she vomited stomach secretion mixed with bile. On some occasions she expelled round worms with the vomiting, and in one instance the vomiting of an ascaris relieved the pain. A probable diagnosis of cholecystitis with calculi was made. Cholecystotomy was performed. The walls of the bladder were hypertrophied, but no rugosity of the mucosa was evident. No calculus was found, but a big *Ascaris lumbricoides* about 8 in. in length, partially obstructing the cystic duct. The operation was completed by draining the gall-bladder. The patient made an uneventful recovery and all the symptoms existing previous to the operation disappeared. Antihelminthic remedies were administered during the convalescent period.

An individual who is seized with hepatic colic-like pain, accompanied with vomiting of *A. lumbricoides*, has the syndrome necessary for suspecting that the case is one of migration of the parasite or parasites into the biliary ducts or gall-bladder; and unless the symptoms subside, surgical intervention is indicated. Antihelminthic remedies must be administered as a prophylactic measure in those cases in which a history of ascariasis accompanies disorders of the gastrohepatoduodenal system. In those cases in which surgical intervention has been practised, antihelminthic remedies must be given to avoid new serious complications.

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THE JOURNAL OF

Tropical Medicine and Hygiene

JANUARY 1, 1919.

THE YEARS 1914-1918 IN THEIR MEDICAL ASPECTS.

A REVIEW of the medical and surgical work during the past four years, although interesting, presents no outstanding development in either military or civil life. In fact, since the War commenced it

can be said that extended experience has confirmed many doubtful points, has uprooted several beliefs, and that whilst useful knowledge has been gained, few, if any, initiations of importance have been introduced. In surgery, Listerism has been upon its trial to an extent never equalled hitherto, and it may at once be said that it has come out unscathed and completely victorious.

We are left, however, with the impression somehow that the treatment of wounds has left something—aye, much—to be desired. The fight with sepsis has yet to be fought; the early septic condition of wounds and their treatment stands pretty well as it did before the War, and even before Listerism. That an infected wound cannot be wholly disinfected is one of the teachings of the War. Listerism has made it possible to render an anti-operation atmosphere of asepsis highly probable, and, it may be said, well-nigh certain when dealing with unbroken skin; but in the case of wounds caused by missiles much has to be learned. The answer to the question: Can an infected wound be reliably disinfected? is in the negative. Listerism does not cover this grave gap in surgery, and it leaves an enormous field of research open to the surgeons of to-day to meet this ever-present defect. Not only in military work is this the case, but in civil life—and that really is the important thing after all, for wounds in war play but an ephemeral part in the field of surgery; whereas wounds in civil life are always with us. War wounds correspond to an epidemic, as it were, which visits us at times, but wounds in civil life are endemic—they are for ever present. The dangers of a compound fracture are with us still as acute almost as in pre-Listerian days, and until that is dealt with and overcome it cannot be said that surgery has attained that high position, which it is essential it should, if we are to bring it into the region of an exact science.

The manipulations of surgery have been perhaps here and there advanced by war experience, but they are chiefly mechanical benefits that are on view at present, and not scientific principles of treatment in any sense of the word. How to render septic wounds aseptic is the surgical question of to-day. That it can be answered there is no doubt, but the solution of the problem is not yet in sight, and until it is solved it cannot be said that surgery has triumphed.

In medicine, including tropical medicine, it does not appear that our knowledge has been advanced in any superlative degree. The cause of typhus fever and the means by which the disease is spread has been elucidated to some extent, and for that elucidation we are thankful. Typhoid fever has been dealt with systematically, and its prevention, whether by hygienic ruling or by anti-typhoid inoculation, has proved beneficial to a degree which, although not complete, has approximated to the point of exactitude. A new (?) disease—so-called “trench fever”—has arisen, and its etiology, pathology, and treatment remain to be dealt with, as well as other features of this ailment, such as does it

occur in peace times? and if so the legend “trench” attached to it is misleading. *Malaria*, encountered on many fronts, in spite of what has been done during the past twenty years, seems to defy all hygienic efforts, at least in the practical sense, and not only so, but the treatment would appear to have retrogressed, if we are to call it a retrogression, as the belief in quinine, whether as regards prophylaxis or treatment, has been largely upset. We are yet without exact knowledge as to the method by which it is to be used in the prophylactic sense, and still more has its potency in chronic malaria been called into question. The big dose is condemned by many, the potency of administration by the mouth is called in question, and some have foregone quinine altogether and taken up arsenic and other drugs in its place as a means of treatment. This chaotic state of things will no doubt do good by tending to break down the “one drug, one disease” treatment of disease in general; the “dock and nettle” system has gained ascendancy, and will take a long time to eradicate, for like all weeds and unwholesome things, it takes much turning over, harrowing, and uprooting to get rid of. Our forefathers were skilled in the combination of drugs in their prescriptions; not so the modern practitioner. His tendency is towards the opposite pole, with detriment to his patient and to his own therapeutic destruction.

Dysentery and its treatment has been prominently before the medical profession during the War. Emetin has been the drug *par excellence* in tropical dysentery, and here again its value has been questioned and even traduced. That emetin holds the foremost place in acute amoebic dysentery is incontestable, but that its benefits do not extend beyond the blood and mucus stage is equally proven. Yet does the drug continue to be given long after the blood and mucus stage has passed, and it continues to be administered in the later, the mucus stages of the disease when colitis is the feature of the ailment. That emetin does good after the acute stage of dysentery is definitely proved to be untrue. The opposite is the case, and persistency in its use is detrimental to the reputation of emetin itself, to the judgment of those who prescribe it, and worst of all, to the sufferers from the disease for which it is administered. With the old treatment by ipecacuanha, colitis did not figure so prominently as a sequela to acute dysentery as it does under the emetin treatment of to-day, when the intestinal catarrh continues indefinitely and recurrences are inevitable. It is to be hoped that good will come of all this, and that emetin for the hemorrhagic stage of dysentery shall be duly given, and with the disappearance of the acute stage the emetin will be left off and ipecacuanha administered forthwith. Then, and then only, will the following colitis be checked and cure ensured.

Another feature of dysentery has been brought home to us during the War, namely, its infectivity. Troops returning to the French front from other areas where amoebic dysentery prevails have infected their comrades, and we have had many instances of men

being afflicted by tropical dysentery who have never been out of France or England. The disease runs the same course amongst those thus infected and requires the same treatment.

A point is sure to be raised and dwelt upon when treatment in military hospitals is discussed, namely, the length of stay of patients in hospital, whether they suffer from medical or surgical ailments. If in civil hospitals patients were kept under treatment for the same length of time as the soldiers in military hospitals, it would lead to inquiries which would reflect discredit upon the doctors in charge and bring ill-repute to the hospital. It must be remembered, however, that a soldier is not allowed to rejoin until he is completely fit; no patching up will do as in civil life, yet if report is true reflections have been made in this direction, and that they will have to be met is a certainty.

J. C.

Annotations.

Pulmonary Sporotrichosis (Bulletins de la Société Médicale des Hôpitaux, Paris, July 19).—Seven years after apparently complete recovery under potassium iodide of a cutaneous mycosis, a workman of 43 presented signs of pulmonary sporotrichosis. The cursory diagnosis had been pulmonary tuberculosis, but the right dullness suggested a pleural effusion. No fluid could be obtained by puncture, and radiocopy disclosed a large tumour in one lung with nodules elsewhere. The *Sporotrichum heurmanni* was cultivated from bloody fluid obtained by puncture in the tumour region. Only five cases of this disease in the lungs are recorded, and only in two of them was the sporotrichum cultivated direct from lung fluid. Its cultivation merely from the sputum in the other cases leaves a doubt as to the diagnosis.

Dangers of Chenopodium Treatment of Uncinariasis (D. A. Roth, Southern Medical Journal, November).—In the wards of Santo Tomas Hospital, Panama, 103 patients were given the oil. Twenty-nine showed signs of reaction. Dizziness, nausea and vomiting, headache, deafness and general depression were the symptoms observed. Deafness is by far the most disagreeable after-effect of the chenopodium treatment. It occurs in 20 per cent. of all the cases, varying in intensity from very mild to a complete loss of hearing, and lasts anywhere from one week to several months. In four of the cases, some deafness still persists two years after the date of treatment. No such reaction was observed after the administration of thymol in similar doses. The oil should not be administered unless there be ample facilities for studying the cases before and after administration. This should include a careful determination of the percentage of hemoglobin. Chenopodium should not be administered to a patient suffering from a high grade of anæmia, nor should the treatment be repeated within ten days.

Abstracts.

A STUDY OF THE DIET OF NON-PELLAGROUS AND OF PELLAGROUS HOUSEHOLDS.¹

By J. GOLDBERGER and others.

To supplement the studies, chiefly experimental, of 1914 and 1915, a study was begun, in the spring of 1916, of the relation of various factors to pellagra prevalence in cotton-mill village communities in South Carolina. This paper presents briefly some of the results of the phase of the study dealing with the relation of household diet to pellagra incidence.

Pellagra incidence was determined by a systematic bi-weekly house-to-house search for cases carried on from April 15, 1916, to December 31, 1916.

The diagnosis of pellagra was restricted to cases presenting a definite, bilaterally symmetrical eruption. It is suggested that, so defined, pellagra includes at least two commonly associated, etiologically distinct, though closely related, syndromes.

Data relating to household diet were secured by obtaining records of sale from the principal stores for a fifteen-day sample period during the season immediately anterior to or coincident with the incidence of the attack as suggested by the seasonal curve, supplemented by inquiries by a trained investigator.

Comparisons of diets of non-pellagrous with those of pellagrous households clearly showed that:—

(1) The non-pellagrous enjoyed a larger supply of the animal protein foods (lean meat, milk, including butter, cheese, and eggs).

(2) Varying supplies of fresh meat were associated with a corresponding (inverse) variation in the incidence of pellagra.

(3) Varying supplies of milk were associated with a corresponding (inverse) variation in the incidence of pellagra.

(4) The calorific value of the diets of pellagrous households was somewhat less than that of non-pellagrous households, but this, nevertheless, conformed to recognized standards, and could therefore not be considered as an essential factor in relation to the incidence of pellagra.

(5) The total protein supply in the diets of the pellagrous households was somewhat less than in that of non-pellagrous households, but was not below Chittenden's standard, and therefore a deficiency in total protein would seem not to be an essential factor in relation to the incidence of pellagra.

(6) The proportion of protein from animal food tends to be somewhat smaller, and that from cereals and the common mature peas and beans somewhat larger in the diets of the pellagrous than

¹ Abstracted from *Journ. Amer. Med. Assoc.*, September 21, 1918.

in those of the non-pellagrous households, and therefore the protein in the diet of the non-pellagrous was likely to be of somewhat better quality than that in the diets of the pellagrous households.

(7) The diets of the pellagrous households included somewhat less of the carbohydrates than did that of the non-pellagrous, and therefore the production of pellagra is not necessarily dependent on an excessive consumption of this food constituent.

(8) The diets of the pellagrous households had a decidedly smaller supply of the fat-soluble, and likewise a somewhat smaller supply of the water-soluble vitamine than the diets of the non-pellagrous households.

(9) The mineral constituent of the diets of the non-pellagrous households was likely to be superior—less likely to be defective—than that of the pellagrous households.

CONCLUSIONS.

(1) The indications afforded by this study would seem very clearly to suggest that the pellagra-producing dietary fault is the result of some one or, more probably, of a combination of two or more of the following factors: (a) A physiologically defective protein supply; (b) a low or inadequate supply of fat-soluble vitamine; (c) a low or inadequate supply of water-soluble vitamine; and (d) a defective mineral supply. In this connection it is of interest to note that McCollum, Simmonds, and Parsons, as a result of their studies of faulty diets in rats, believe that pellagra is primarily associated with the unsatisfactory character of three dietary factors—namely, a shortage of "fat-soluble A," the faulty character of the inorganic moiety, and the relatively poor quality of the protein mixture.

(2) The somewhat lower plane of supply, both of energy and of protein, of the pellagrous households, though apparently not as an essential factor, may, nevertheless, be contributory by favouring the occurrence of a deficiency in intake of some one or more of the essential dietary factors, particularly with diets having only a narrow margin of safety.

(3) The pellagra-producing dietary fault may be corrected and the disease prevented by including in the diet an adequate supply of the animal protein foods (particularly milk, including butter, and lean meat).

MORE MILK FOR VITAMINES.¹

MORE than ten years ago experiment showed that an animal cannot live "on a mixture of pure protein, fat and carbohydrate; and even when the necessary inorganic material is carefully supplied, the animal still cannot flourish." In connection with these investigations was made the important

discovery that a surprisingly small amount of milk as well as extracts of some other natural foods confer a nutritive adequacy on the otherwise insufficient ration. Meanwhile it was demonstrated that the residual part of milk from which its fat and protein had been removed exhibited a growth-promoting or nutrition-promoting property when it was added to mixtures of the purified familiar food-stuffs, and that the fat of milk (butter fat) also exerts a further growth-promoting influence presumably due to something different from the known fats but closely associated with them. Thus the significance of the vitamins—a water-soluble and a fat-soluble type respectively—in milk became established.

These discoveries have since been verified for various species. The lack of either the fat-soluble or the water-soluble essential properties has been believed to lead to distinct pathologic consequences when these vitamins are not replaced from other sources in the diet. Conversely, the presence of these "specifics" for good nutrition and growth contributes in no small measure to make milk the unique food that it is justly regarded to approximate. Hence we can understand what is intended by this fanciful comment: "When the milk pitcher is allowed to work its magic for the human race, we shall have citizens of better physique than the records of our recruiting stations show to-day. Even when the family table is deprived of its familiar wheat bread and meat, we may be strong if we invoke the aid of this friendly magician."

A more recent conclusion is that from a quantitative standpoint cows' milk is not as rich in the water-soluble vitamine as one not familiar with the experimental evidence for this property of the food might assume. This is in no sense to be construed as a denial of the "magical qualities," but rather as an argument for the more liberal use of milk when it is relied on largely to contribute the growth-promoting factors in the diet. From a practical standpoint it appears not unlikely that the need of children and other growing animals for the water-soluble vitamine, beyond the earlier stages of development when milk admittedly satisfies the nutritive requirements, may not be adequately filled by some of the current or enforced dietary practices. Thus with a too scanty allowance of milk, a liberal inclusion of products from cereals rendered poor in vitamine by milling, of sugar, fats, and few additional animal products other than meat (which has been shown to contain relatively little of the water-soluble vitamine), it is not surprising if disasters sometimes manifest themselves.

Another aspect of the significance of the quantitative studies of the vitamins in cows' milk is the relation to milk dilution in infant feeding. It is a common practice to reinforce the supply of calories by diluting top milk and adding lactose. Under these circumstances the child is supplied with a food that contains a relatively smaller proportion of the water-soluble vitamine than does the original cows' milk. While milk thus modified may

¹ Abstracted from the *Journ. Amer. Med. Assoc.*, November 9, 1918.

contain sufficient vitamins as long as the food intake is normal, if for any reason the child's appetite fails the vitamin supply is reduced and endless dietary troubles may easily result.

Without attempting to evaluate the actual degree of danger attributable to such causes in the artificial feeding of infants, we may well bear in mind the potentialities for harm. It may be that the young of healthy mothers are born with a reserve supply of the so-called vitamin substances sufficient to maintain them in good nutritive condition until the time when they begin to eat other food-stuffs. If milk is not always as rich in vitamins as is desired at later stages of growth, there may be real wisdom in the practice of extending the diet as soon as the physiologic conditions of the individual warrant the use of other foods.

REDUCTION OF BODY WEIGHT IN WAR TIME.¹

In Berlin in 1916 the food among large groups of the population was represented by an energy intake of between 2,200 and 2,300 calories a day, with an average protein content of from 65 to 68 gm. Such a regimen may be adequate in respect to its quota of protein, but the energy that it represents would in general scarcely satisfy a sedentary person.

Since then a significant confirmation of the effect of the war-time diet on the weight of the average German male citizen has been disclosed. In Munich men under 50 years of age had experienced an average loss of weight amounting to 10 per cent. in the two years preceding 1918. The former normal of 70 kg. for the adult man must be regarded as represented by 60 kg. in 1917 in Germany. Among a group of medical students examined in the spring of 1917, all had experienced losses of weight amounting to 4 or 5 kg. during the War.

Such experiences raise the question as to the actual effect of a prolonged and considerable reduction of the diet on the metabolism. Since the law of the conservation of energy applies in the human organism, the food requirement must be equivalent to the metabolism in any event. Is this a fixed factor, so far as the maintenance component is concerned, or does it become altered with changing planes of nutrition? When the body weight declines as a result of short rations, is a point of equilibrium finally reached at which the scant supply suffices? To answer such pertinent questions, observations were made on men averaging 62 kg. in weight and kept on restricted diets, including 60 gm. of protein and 1,600 calories a day. The basal metabolism of these persons (at rest without food) averaged 1,400 calories. On the limited food intake there was continued loss of protein, amounting to nearly 12 gm. a day. When an additional 500 calories in the form of carbo-

hydrate (lactose) were fed, the loss of nitrogen was nearly averted, showing that when enough total food energy is furnished, 60 gm. of protein in the daily diet may suffice to prevent loss of nitrogen from the tissues.

So far as the observations on the minimal protein requirement are concerned, there is nothing essentially new in these findings. It has repeatedly been demonstrated that the conventionally assumed requirement of more than 100 gm. of protein a day is unnecessarily high in the light of modern researches. The energy features of the restricted diets cannot be so lightly dismissed. After reduction in body weight there was a lowered basal metabolism attributed to a decrease in the active cell substance of the body. The persons involved were far from comfortable on the restricted diet; and when the task of a long march was further imposed on them, symptoms of distress ensued. In other words, the scanty maintenance diet of 2,100 calories for an adult man leaves no factor of safety for vigorous physical exercise.

In America somewhat analogous, though far more elaborate studies, were made on the effects of a prolonged reduction of diet on twenty-five men. A gradual reduction in weight to a point 12 per cent. below the initial weight took place during a period of from three to ten weeks, with low calories and a moderate amount of protein in the food intake. The normal demand of the men prior to the dietetic alteration ranged from 3,200 to 3,600 net calories. One squad of twelve men subsisted for three weeks on 1,400 net calories without special disturbance. Notwithstanding the great reduction in the metabolism (believed to be due to the removal from the body of the stimulus to cellular activity of approximately 150 gm. of "surplus nitrogen"), the whole period of lowered food intake had no untoward effect on the physical or mental activities of these men, and they were able to continue successfully their college duties. The psychologic report concludes that a prolonged reduction in diet produces some decline in neuromuscular activities, but this does not seem nearly so definite or so large as the changes in metabolism and allied measurements. The psychologic changes were not such as materially to interfere with a satisfactory discharge of the common duties of student life.

Seemingly in contrast to the German experience, carefully selected American subjects were less distressed by the privations of the diet. The measurement of their metabolism in walking showed a marked saving in the energy requirement for walking in favour of the reduced diet, whether considered on the basis of the gross energy expended, which represents the real cost to the individual and to the national food reservoirs, or on the basis of the energy required per horizontal kilogrammeter. Nevertheless it will be wise, in view of conflicting statements, to hesitate to lower the body weight of the populace at large to any considerable extent by rationing measures for the debated advantage of greater efficiency. The significance of "surplus protein" has not yet been clearly defined.

¹ Abstracted from the *Journ. Amer. Med. Assoc.*, November 9, 1918.

Original Communication.

COMMON DISEASES SEEN IN BRITISH HOSPITALS AS SEEN IN SIERRA LEONE.

By W. A. YOUNG, M.B., Ch.B., D.T.M.

Medical Officer in charge of Laboratory, Colonial Hospital, Freetown.

The following account gives some idea of the commoner diseases met with in more temperate lands, as they are seen in Sierra Leone, and particularly Freetown.

It must be remembered that this article relates to the indigenous population only and not to the resident European or foreigner, nor to the sick stranger brought off a steamer.

The proportions and percentages mentioned are as accurate as they can be made at present, as it was only in 1913 that death registration was made compulsory, and unless the cause of death is signed by a medical officer, is otherwise worthless.

The population of Freetown, according to the 1911 Census, was 34,090, perhaps under that now.

RESPIRATORY SYSTEM.

The complaint most frequently dealt with under the heading is *acute bronchitis*. It is common all the year round, but especially so during the harmattan¹ season and the rains.² The acute stage rarely lasts more than two or three days. This may be due to the moist atmosphere allowing free expectoration. Chronic bronchitis is also met with, but scarcely to the same extent as at home.

Apart from being a disease in itself, bronchitis is also a symptom of malaria, more especially in children. It is always well to examine a child's spleen and blood when brought suffering from bronchitis; for, although without a temperature, parasites are nearly always to be found, and quinine will cure both conditions by killing the parasite. In the out-patient departments roughly 1 in 6 is treated.

Pneumonia.—This is a very fatal disease, accounting for 6 per cent. of the total deaths in one year. It is also the cause of some of the sudden deaths, e.g., just the other day three youths were having

a rough-and-tumble fight, when one dropped dead. At the inquest the medical evidence showed, apart from other things, that the deceased had a commencing right basal lobar pneumonia. He had not complained previously. The native seems to have very little resistance to this malady, e.g., a man, working all day, went home, and complained of feeling chilly at 5 p.m. He was dead at 10 p.m., and post-mortem examination showed both lungs solid. As at home the adult suffers from the lobar, while children usually the bronchopneumonic type. The time of year most favourable for this affection is the harmattan¹ and beginning of the rains,² but cases are met with all the year round.

Counting the sudden deaths 30 to 50 per cent. of patients succumb. Males appear to be affected twice as often as females, and two-thirds of the cases occur from 20 years of age and upwards.

Pleurisy is met with in about the same number as pneumonia according to hospital reports. Some are undoubtedly tubercular and lead to effusions. Pleural effusions, the result of anæmia and heart trouble, are quite common. Empyemas appear to average two to four per annum, and are pneumococcal in origin as a rule. Pleurisy, however, does not seem to cause the native much concern, because it would appear much commoner than records show, for in roughly every second post-mortem made there are signs of old pleurisy. Perhaps a left-sided pleurisy may simulate to his feelings an enlarged spleen during a malarial attack, or perhaps the pleurisy may be malarial in origin.

Emphysema as a compensatory measure must and does occur, but as a disease *per se*, i.e., the hypertrophic form, it is doubtful if it exists to any extent, if at all. As the result of bronchitis and the like, it is not often diagnosed, and post-mortem work shows, except where the lungs are the main organ implicated, these organs usually well collapsed.

Bronchiectasis is occasionally seen, and in one case was definitely due to a large mediastinal gumma.

Abscess of the lung is seldom met with, and apart from tuberculosis, is usually due to an amebic abscess of the liver bursting through the diaphragm.

Tuberculosis.—It is difficult to say whether this disease, with its diversity of forms, is an old established disease like malaria or one of more recent importation. In favour of the latter idea, it may be stated that the chronic forms, such as tubercular knee, caries of the spine, tubercular glands of the neck, &c., are rarely seen, also one does not find post-mortem signs of healed tubercular lung. The usual type is phthisis pulmonalis, which is quickly fatal. There would appear to be little or no immunity. Inhalation seems to be the only source of infection, because no milk other than tinned is consumed, and tuberculous cattle, allowing they do cause a small percentage of infection, are very rarely seen. If infection occurred often through the tonsils, one would expect to see more of tubercular glands of the neck.

¹ The Harmattan is a cool dry wind laden with small dust particles blowing from the interior of Africa along the Guinea Coast during December, January, and February. It causes great irritation to eyes, nose, and throat, and makes the lips crack. Compared to the Highlands of Nigeria, we are not much troubled with it here, as it rarely lasts longer than three weeks. The sudden change from a moist to a dry cold air undoubtedly lowers the native's resistance, and makes him more susceptible to respiratory complaints.

² An average rainfall is 145 in. The rainy season starts with tornadoes about the end of May. The wettest months are July and August. The end of September, or early October, usually sees the commencement of the tornadoes leading to the dry season. This season is the most unhealthy, there being a big increase in fevers, and gastro-intestinal troubles, especially dysentery, are very prominent. The very humid atmosphere, apart from other reasons, causing a great diminution in perspiration undoubtedly causes intestinal fermentation and irritation, making a condition suitable for amoebæ, &c.

Freetown itself is eminently suitable for the spreading of the disease by inhalation. During the dry season there is abundant dust everywhere. The aboriginal native especially, and even the more educated native, sleeps in small rooms with no ventilation, all doors and windows being shut, sometimes four to six people sleeping in the same room, the beds being screened off from each other by curtains. One is thus led to conclude that inhalation is practically the only source of infection at present, and that once established in the lung the disease runs a very rapid course, death ensuing before any healing takes place or the more chronic forms can develop.

I am inclined to think that as modern civilization tends to advance out here and the native adopts more and more a town life and work and a possible tendency to alcohol, so the tubercular incidence will increase. In favour of the last sentence, although this paper is only dealing with the stay-at-home native, may be stated the fact that a number of the cases seen are those who work on ships which have been in more temperate climes where tubercle abounds.

Phthisis Pulmonalis.—Freetown, in particular, harbours quite a number of such patients. As seen here, it lacks the chronicity found at home, and although not of the "galloping" type, is distinctly rapid in its course, and it is nearly always safe to prognose death in from three to six months after making the diagnosis. This may be because one does not always see the case till well advanced, but the early diagnosed case is also rapid. In either, when seen, there is never any doubt as to the diagnosis, if it is tubercular, for tubercle bacilli are found in enormous numbers compared to the scanty one or two seen at home.

Hæmoptysis is a frequent symptom, and often the cause of death.

Phthisis is seen from the age of 10 to 60 years, and appears to affect both sexes equally. I have not seen a case in the very young.

Death-rate is at least 99 per cent. of cases. Very rarely is a case of chronic fibroid phthisis met with.

Of total deaths, 5 per cent. are attributable to this malignant affection.

Rheumatic Fever.—As far as I am aware, and I think most doctors here will agree, this affection is not found in natives who have not been out of Sierra Leone (*vide* footnote 3). Rheumatisms due to various causes are common enough, but have no relation to acute rheumatic fever.

It is to be hoped that the term rheumatism will soon be abolished, as under such a heading is put many times a symptom which our ignorance or laziness fails to accord to the correct disease. It has been very definitely brought to my notice, while making post-mortem examinations, the rarity

of any damage to the cardiac valves, especially the mitral.

This greatly supports the opinion of the absence of rheumatic fever here, and a further support is exhibited in the absence of Sydenham's chorea.

Mitral Affections.—Mitral endocarditis is seldom come across, and when found is associated with gonorrhœal rheumatism, lobar pneumonia with pericarditis, or may form part of a general septicæmia.

Mitral incompetence is often met with clinically, but is really a symptom of cardiac dilatation and myocarditis. In the Freetown Prison as many as ten to fifteen out of 300 inmates are usually afflicted in this way.

The heart is frequently of the *cor bovinum* type, apex beat 2 in. below and to the left of the nipple, and the mitral first sound accompanied by a soft but full-blowing murmur. It gives the impression of an unimpeded backflow, i.e., no tags or vegetations striking the back stream. Under complete rest and perhaps a little digitalis these murmurs may quite disappear, provided, of course, the dilatation is not permanent.

If the heart is not fully compensated, a little exertion will soon bring the murmur back again.

In fact, when a newcomer has a large heart he is made to run round the prison yard, and if a murmur is discovered he is put into hospital.

What I wish to show is that in most of these cases of mitral incompetence the mitral valve itself is intact, and that a permanent murmur is due to permanent dilatation resultant on myocarditis (*q.v.*), and these statements are borne out by post-mortem results.

Myocarditis is common, and is undoubtedly the cause of the numerous cases of dilatation and mitral incompetence. The chief causes would appear to be ankylostomiasis, acting directly by its toxin, and indirectly by the anæmia caused, ascariis and its toxins (possibly), syphilis, and gonorrhœa.

The native, although not energetic, will carry very heavy loads on his head, and the strain on the heart is considerable. Taking the latter consideration into account with the myocarditis, it will be readily seen why dilatation is not so frequently followed by compensatory hypertrophy as might be desired, and why a permanent mitral incompetence is a common occurrence in the Sierra Leone native.⁴

Tachycardia is quite common, being often associated with irregularity. Apart from the ordinary causes and ankylostomiasis, I cannot help thinking there may exist a gonorrhœal neuritis of the vagus nerve. Gonorrhœa is very prevalent, and in these

⁴ Dr. Butler ("Yellow Fever Commission Reports," August 18, 1915, vol. ii, p 411), states that he found a case, but is careful to add the word "probable."

⁴ A concrete example supporting the proof that incompetence is mainly due to myocarditis is afforded by the following: A prisoner had a typical mitral regurgitation. He was treated in hospital, improved, and later was discharged from prison. Just recently he was reincarcerated. There is absolutely no mitral murmur, but he has a marked tricuspid one. Evidently his left heart has compensated while his right has not. His Wassermann reaction is markedly positive, and he is now having galy treatment, and is improving remarkably.

cases there is often epigastric pain and digestive disorders.

Extensive chewing of tobacco or "snuff" is also a prominent cause. Dr. C. H. Allen also states that the kola nut has this marked effect.

Pericarditis.—The "soldiers' spot" is frequently met with both clinically and post-mortem. Suppurative pericarditis is not common, and is usually associated with double lobar pneumonia.

Aortic Valve Lesions.—These are occasionally met with and are due to the gonococcus, aneurism first part of the aorta or gumma affecting the heart at the site of the valve. Some of these are seen in post-mortem examinations on people who have died suddenly.

Aortic murmurs are discovered frequently, but their origin would appear to be mainly the anemic condition of the blood or myocarditis, the remainder being due to the valve lesions mentioned above.

Arteriosclerosis is prevalent. (Cf. syphilis.)

Fevers.—There is no evidence to show that scarlet fever exists amongst the natives.

Small-pox is endemic, and although usually well in hand, occasionally becomes epidemic in some district where the facilities for vaccination have not been taken advantage of.

Mumps is occasionally met with.

Chicken-pox is to be found all the year round, especially in children. Occasionally an outbreak may be recorded. Fatal terminations are not often witnessed.

Measles.—Although rarely seen by a medical officer on duty, measles is, for all that, very common, and is regarded as a very trivial disease. It would appear to be an old-established malady, because there appears to be great immunity to after-effects, such as otitis media, mastoid disease and eye troubles, and very rarely is there anything of the nature of an epidemic. The last, I understand, occurred in 1905, but there are no records to that effect. The native superstition is that after a measles outbreak it is as well to look out for small-pox. (Cf. Osler's "Medicine." Measles: History.)

Chalk is also smeared round the eyes, presumably as a preventive to eye trouble, and would indicate that at an earlier period measles was of a severer nature. Undoubtedly deaths occur, but as they are recorded as bronchitis and bronchopneumonia, the ratio of deaths to cases cannot be given.

The probability is that all children contract the disease when young. I have only seen two adult cases, and they made an uninterrupted recovery.

Whooping-cough is very prevalent, but does not appear to be nearly so fatal as at home. All the deaths appear to occur under 5 years of age, and at least half during the first twelve months of life.

The deaths recorded vary from three to twenty-five in different years, but as to the total number of cases it is impossible to tell.

It is probable that the number of deaths is fairly accurate, as bronchopneumonia and heart failure

would be readily associated with whooping-cough, although not with measles. I have seen no adult case.

Two curious beliefs exist, one as to the efficacy of tying a key round the neck, and a second, which is to make the child micturate into his hand and drink the urine to relieve the spasm. It is said to be useful, but as the child could not drink till the spasm was over, its curative effect is very doubtful.

Typhoid.—There have been five cases notified in natives over a period of six years. Whether these patients had been outside the colony cannot be stated. The Widals were positive in three, and there was one death. Post-mortem examination confirmed diagnosis. Imported cases are occasionally met with, and it is possible these natives were infected from such. Anyway, it does not appear to spread, and as no case has been observed since March, 1914, it does not appear to be endemic, unless it is of such a mild nature as to totally escape observation. Partly supporting the non-endemism is the fact that cholelithiasis is not known amongst this particular people.

Its course in natives is similar to that in Europeans.

Diphtheria.—There is no evidence that it occurs.

DIGESTIVE SYSTEM.

Teeth.—There is a popular fallacy at home that natives possess good teeth. They may do so in other tropical countries, but here at least seven out of every ten show dental caries at various stages.

Stomatitis is common, and one particular form is always associated with dyspepsia and constipation and dry scaly excoriations at the angles of the mouth. Scrapings from such lesions show the presence of a bipolar bacillus and a diplococcus. The former is always present.

Dyspepsias and *Gastritis* are always with us, and may be due to too much carbohydrate diet.

Dilatation of the stomach, as a disease in itself, is seldom recognized.

Gastric and Duodenal Ulcers, if they occur, must be extremely rare, as I can find no record of such a condition being operated on.

Hernia.—Inguinal hernia is one of the commonest of complaints in males. Both sides are affected, but the right much more frequently so. It is to be regretted that definite figures are not to be had, but the consensus of opinion is that for one left there are nine cases of right inguinal hernia.

The causes are probably the same as at home, i.e., a preformed sac and severe exertion of some sort. Since all heavy loads are carried on the head, it will easily be understood the severe strain that is put on the inguinal rings when the load is being lifted up from the ground.

The native does not worry unduly about the condition, and unless there is pain, probably due to dragging on the mesentery, or finds that his penis is becoming surrounded by the mass, does not often

seek relief. I do not mean he does not appreciate the advantages of an operation—far from it. What I mean is that he leaves well alone.

Thus at the operation the external inguinal ring will admit one finger with extreme ease, and two without much difficulty. The sac often contains 2 to 4 ft. of gut, and as hydrocele is a common accompaniment, the total tumour often reaches half-way to the knee, and occasionally past that point. Dr. J. Y. Wood suggests that the hernia may be the result of a large hydrocele weakening the abdominal wall.

Strangulations are not at all infrequent and often occur amongst the coaling gang.

They do well under operation, but it is difficult to persuade the patient to lie still and do nothing for a sufficiently long period to allow of firm union of the parts. About one in every five seen is operated on. About three to five in every 100 males have inguinal hernia. Congenital hernia is seen in one out of about 300.

Femoral Hernia is very seldom seen. I have only seen one case in five years, and that in a female.

Umbilical Hernia.—Compared to home statistics, umbilical hernia is very common here. It is due to the cord being tied too far away from the umbilicus and to being clumsily severed and becoming septic. Dr. Wood informs me that amongst some tribes a neat umbilical hernia is looked upon as a thing of beauty in a woman. Strangulation does not often occur in such, however. Through this hernia one may easily palpate organs, such as the spleen, and much information can be obtained in this manner.

Appendicitis.—As far as I am aware this affection has not yet been demonstrated in the male, and cannot really be said to exist in the female either, although the peritoneal surface of the appendix may become inflamed if situated near a salpingitis or pyosalpinx. I have paid particular attention to this organ in post-mortem work, and always found it patent and lying free. Some appendices are very long, and are found lying in all directions described in text-books. Considering the frequency of constipation, it is difficult to understand why inflammation of this organ does not occur. Perhaps some chemical condition of the food or toxin is lacking or some necessary organism. Dr. J. Y. Wood thinks the squatting attitude adopted in defecation may also help to explain non-inflammation of the appendix.

Dysentery.—This is the most important disease of the intestine. It is of the amœbic type, and has greatly increased since the War commenced.

Carelessly neglected, it is not at all uncommon to find the intestine post-mortem to be a mere tube, the patient having died of so-called diarrhœa. In the records death is often said to be due to diarrhœa, but the real cause is undoubtedly amœbic dysentery. It is very common indeed from the age of three months upwards.

Intussusception is met with now and then, and is apparently due to straining, as in dysentery or amœbic cystitis.

Liver.—Cirrhosis is now and then come across, and is due to gin drinking.

Fatty Liver is often found, post-mortem especially, after recurrent amœbic dysentery.

The absence of *cholelithiasis* has already been commented upon.

Gummata are exceeding common, and in people who have died of some other affection than syphilis may often be found numerous old fibrous scars, the sites of old gummata and the last gumma undergoing a like change.

Catarrhal Jaundice is met with frequently, being in some cases digestive in origin, but in most malaria would appear to be the cause.

Kidneys.—Horseshoe kidney has occurred once in 200 post-mortems.

Floating Kidney, if it occurs, has not yet been recognized.

Renal Calculus.—I can find no evidence that a case has been operated upon.

Nephritis.—The acute and subacute forms are found in the ratio of 1 to 15 of the chronic interstitial variety.

About one in every eighty internal admissions, out of a total of 2,500 at the Colonial Hospital, was an interstitial nephritis. Syphilis is probably the main cause of the last-named variety.

Pyelonephritis occurs after a neglected stricture with chronic cystitis, perhaps two cases a year being seen.

Tonsils.—Compared to home statistics, follicular tonsillitis is rare, about one in every 300 cases seen, and so with the suppurative form.

Enlarged tonsils are seldom seen, and there never appears any need to remove them.

These lymphoid tissues, however, are much affected in secondary and tertiary syphilis.

Adenoids, if they exist to any degree, are not recognized as requiring removal.

Nasal polypi do occur, however, perhaps two in a year being snared. Pharyngitis, both acute and chronic, are the conditions known as sore throat out here; the condition is very prevalent.

Blood Diseases.—These are seldom come across, Lymphatic and myelogenous leukaemia, perhaps a case in one to three years. It is doubtful if genuine chlorosis exists, and if pernicious anaemia occurs, it has not been seen for many years.

Simple anaemias are common enough, but are only symptoms of many tropical diseases.

Nervous Affections.—Sydenham's chorea is not found here. Huntington's or senile chorea occurs, likewise paralysis agitans.

Hysteria is met with now and then, but whether genuine neurasthenia exists is doubtful.

Epilepsy is quite frequent, an average of thirty cases a year being treated.

Disseminated sclerosis, perhaps a case a year.

Locomotor ataxia is not so uncommon, and quite

a number are met with at the prison, although they are not met with in the proportion one would expect, considering the amount of syphilis.

Anterior poliomyelitis, although rarely seen at the time of the convulsion, must occur fairly often, if one is to judge by the number of people so affected and seen in the streets.

Meningitis is not often seen, an average of two cases a year being dealt with. They are often traumatic in origin, e.g., fractured base, and the pneumococcus is the existing organism. As far as I am aware, cerebrospinal meningitis has only been imported, and does not occur here. There are no records to show that tubercular meningitis occurs, and, personally, I have not seen such a case.

Syphilis.—This is a very common disease, and is one of the great health-undermining factors. Considering the frequency of the disease, one would expect numerous cases of para-syphilis, but such is not the case. It is probable that intercurrent diseases brings on a fatal issue before para-syphilis shows itself. Very rarely does the medical man see the hard chancre. It is realized as venereal, but of little consequence as a rule. Early secondaries are not often seen either, but rupee is often treated, being regarded by the owner as "bad craw-craw." Tertiary symptoms, e.g., ulcers, are common, but unless the gumma affects some vital spot little notice is taken by the native, and post-mortem many livers show healed and growing gummata, which the deceased had been quite unconscious of.

But that it is very prevalent is shown by the large percentage of positive Wassermanns obtained, where yaws may be excluded, and by the splendid effect of treatment by the arsenical compounds.

There is a very definite syphilitic syndrome to be seen in prisoners, for example, i.e., pains in the back and waist, anaemia, thickened veins, lethargy. The tested blood shows Wassermann reaction positive, and treatment quickly cures the condition.

It is a very remarkable fact that congenital syphilis is rarely seen. The probability is that such children die shortly after birth or are still-born. The infant mortality is very high, and a large percentage are either still-born or die a week or so after birth.

There has been no case of interstitial keratitis seen at the Colonial Hospital for certainly ten years.

It is difficult to give any definite figures, but out of 256 convicts fifty-three gave positive Wassermann reaction, and have had splendid health since their treatment by salvarsan or substitute.

Gonorrhoea.—This is only too common, although from hospital records one would be led to think otherwise, but unless complications follow treatment is seldom asked for. It is in such an institution as the prison that the correct figures are to be got, and over a period of five years, in about 5,000 male newcomers, it is seen that roughly one in every six have acute gonorrhoea. This disease is

certainly a great underminer of health in Sierra Leone.

The frequency of stricture urethrae appears to be a debatable point. Personally, I have been fortunate, for in the above period at the prison only twelve cases of stricture required treatment and none operative interference. Drs. Wood, Deane, and Wright state they are much oftener met with than the above statement implies. It will be interesting to investigate this point in the future, i.e., the relation between the gonorrhoeal rate and the stricture incidence.

Eyes.—Probably, as the result of increasing education, anmetropias are often seen. Unfortunately, in many cases, they are neglected till too late. Especially is this so in myopia. Within the last two months I have examined the eyes of five boys, all of whom showed the disc and retinal changes of progressive myopia.

Hypermetropia rarely requires to be treated.

Presbyopia is common enough, as would be expected.

Astigmatisms, both with and against the rule, are frequent, and are usually found in company with the myopias.

It is impossible to give any figures, but, guessing from the advanced myopes I have seen, I would say that myopia in particular is prevalent to a greater extent in schools than is realized at present by the educational authorities.

Cases of concomitant strabismus are very rare. (Cf. hypermetropia.)

Corneal Ulcers are met with on an average twenty times in 30,000 out-patients, and are mainly traumatic in origin.

I have not seen the pneumococcal ulcer, and one rarely sees a good hypopyon, the result of corneal ulceration.

Gonorrhoeal ophthalmia is occasionally seen and may cause ulcers. Other causes operate as at home. It is more than likely that corneal ulcers are much more frequent, but as a vital part is not affected, the native may leave the cure to Nature.

A fact of prime importance and surprise is the rarity of cases of ophthalmia neonatorum. Dr. Wright has seen three cases in two years, and I have only seen one. It is difficult to understand why this should be so. It suggests that infectivity of the vaginal canal is not the sole factor causing the condition.

Iritis.—Apart from such as occur in corneal ulcer cases, iritis is not recorded as occurring often—about once in 1,500 out-patients. Mainly due to syphilis, occasionally gonorrhoea.

Senile cataract is as often seen as at home.

Optic neuritis is met with in increased brain pressure cases and syphilis, but would not appear common. There are no figures to be had.

Optic atrophy is met with in locomotor ataxia and disseminated sclerosis cases.

Seen perhaps once a year, congenital cataract, gloma retina coloboma.

The Ear.—The main characteristic of the native ear is that it seldom requires medical attention.

Otitis media is not common and seldom gets beyond a serious inflammation. Chronic otorrhoea is rarely seen.

I know of no case of mastoid disease occurring. Probably the absence of adenoid growths may explain the lack of such cases.

Tetanus.—Roughly, one case in two months is treated, and, with the serum treatment, usually does well.

Eclampsia.—From 2 to 3 per cent. of patients delivered develop eclampsia. That labour is a normal thing with the native is far from the case, and many cases must die in the bush for lack of medical aid. Last year no less than fifty-six cases of abnormal or complicated labours out of a total of 109 admissions were relieved at the Colonial Hospital, including all classes of patients. (Taken from Dr. E. J. Wright's statistics.)

Influenza.—If the disease is not true influenza it bears a very strong resemblance, except that it does not appear to be so severe. In 1913, thirty-one; 1915, twenty-seven; 1916, forty-three cases were treated respectively. In 1914 no cases appear to have occurred.

Tumours.—Lipomas and fibromas are frequently met with. Sarcoma is not often seen, but does occur. I understand the late Dr. Renner demonstrated some years ago that carcinoma of the cervix uteri occurred. The other day sections of a lip² tumour revealed the growth to be epitheliomatous. Undoubtedly cancer is rare, but the fact to be remembered is that it does occur.

Ovarian cysts occasionally require removal, and uterine fibroids are not at all uncommon.

Rickets.—Of recent years there has been an increasing tendency on the part of the better classes to use artificial feeding for the infant. Coincident with this rickets is apparently increasing. The usual custom was to breast-feed at least two years. Dr. Wright states that goat's milk is greatly used. So far Malta fever has not been found here.

Lunacy.—The following figures are from Dr. Campbell, who is in charge of the Kissy Asylum:—

There is a daily average in the asylum of about 140 to 150, the proportion of males to females being about two to one.

The commonest affections are acute mania—acute religious mania—the chronic varieties—and melancholia.

There are about forty new admissions each year, with an average death-rate of sixteen males to seven females.

The acute and chronic conditions are in about equal proportions. It will thus be seen that a large number of the acute cases recover sufficiently to be discharged.

In conclusion, I would thank Dr. Tweedy, Honourable Principal Medical Officer, for permission to publish this article; also Drs. C. H. Allan, J. Y. Wood, N. S. Deane, E. J. Wright, and W. F. Campbell; also Dr. W. Allan, Medical Officer of Health, for kindly criticism and suggestions, and Dispenser Nylander for the information about the native customs.

Colonial Hospital,
August, 1918.

Anthrax Vaccine in Treatment of Leprosy (J. M. Campos, *Vida Nueva*, September).—Remarkable improvement in two cases of leprosy in which an anti-anthrax vaccine was given systematically. The bacillus of lepra seems to be unable to survive the action of the toxins elaborated by the anthrax bacillus. He injected lepra patients with cultures of the anthrax bacilli. This seemed to modify the tissues in such a way that the lepra bacilli soon perished. The rapid improvement was paralleled by the disappearance of living bacilli from the field until no further active bacilli could be found in specimens of lymph and nasal secretions. Campos urges others to give this simple and inexpensive biologic treatment a trial. The dose each time was 0.5 c.c. of the liquid vaccine against bacterial anthrax, obtained from the Pasteur Institute.

Pellagra.—Figures covering the death-rate for pellagra in the United States among the policyholders of the Metropolitan Life Insurance Company showed a decrease during 1916. In 1911 there were 277 deaths among its policyholders from pellagra; in 1915 the number had increased to 650, and the rate had increased from 3.6 per hundred thousand exposed persons to 6.7. In 1916 the deaths fell to 368, and the rate to 3.6 as in 1911, a drop of 46 per cent. in 1916 as compared with 1915. This drop was observed in many districts of the South where the company does business. It is suggested that the drop in the death-rate from this disease coinciding with the greater prosperity of the agricultural portion of the South during the high prices incident to the war in a way confirms the tentative conclusion of some of the government experts that pellagra is a "deficiency" disease induced by insufficient, poorly balanced dietaries rather than an infectious disease. The statistics of the company further show that the disease is more prevalent among the coloured than the white people, and more frequent in women than in men. It is also indicated that the incidence of the disease increases with age.

² This patient was a policeman, seen by Dr. C. H. Allan and sent to me as a possible specific case. The Wassermann reaction was absolutely negative. A prominent tooth which was probably irritating the spot was removed, but healing did not take place. Dr. J. Y. Wood then cut off a piece which I sectioned, and it was found to be a beautiful specimen of epithelioma.

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THE JOURNAL OF

Tropical Medicine and Hygiene

JANUARY 15, 1919.

TROPICAL AILMENTS AND THEIR PREVENTION: A COURSE OF INSTRUCTION FOR THE PUBLIC.

THE authorities of the College of Ambulance, 3 and 4, Vere Street, London, W., have issued a syllabus of lectures and demonstrations on Tropical Ailments and their Prevention, to be delivered to the public. The lectures and demonstrations are to be given by several well-known experts in tropical medicine. The section of the public more especially interested will be those who contemplate leaving home shores to travel or to take up their residence in warm climates. The object and purpose of this course is to afford those more immediately concerned an opportunity of acquiring the necessary knowledge how to protect themselves against the preventable diseases prevalent in tropical and sub-tropical countries to which they are about to proceed. It need scarcely be said that we welcome this fresh departure of first-aid work by the College, which has already done so much for first-aid in ambulance

work by giving us a technical school of instruction worthy of the great branch of medicine and surgery which first-aid demands, if it is to be raised to a standard of efficiency worthy of the importance of the subject. The addition of first-aid in tropical diseases to the curriculum of the College meets a great public need, for it is a branch of practical hygiene of imperial importance, and never more required than now.

Exodus of Demobilized Men to the Tropics.

The young men now being demobilized from the Army and Navy are at present flocking to the offices of our banks and merchants whose spheres of activity lie in tropical countries. They declare that employment at home offers but few attractions, and they are anxious to go abroad, where better appointments are obtainable and fresh fields are open to them. We do not blame them; in fact we admire their spirit and would encourage them in their desire; for the needs of the Empire demand their presence abroad if we are to hold our own in the world—the reconstructed world of which we hear so much.

To What are we Sending Them?

Whilst encouraging this exodus of our young men, many of them fresh from the battlefields, it behoves us to think for a moment to what we are sending these men—the flower of our manhood. The answer is to places with climates similar to those experienced during the war, such as Macedonia, Syria, Mesopotamia and East Africa, where disease is rife, where few escape infection by malaria, dysentery or other ailments; where the available strength of our Armies at any given moment was decimated by disease, and entire battalions were crippled in their power of offence or defence by insidious and unfamiliar ailments.

Unprofitable Commercially Unless Protected.

To send men at ages from 18 to 25, the period of life at which they are most susceptible to contract these diseases, and without attempting to stem the infection, is, to gauge it by the standard of commercial interest alone, unwise, involving a loss in trade and a waste of money owing to sickness and loss of energy; a condition of things which shrewd men of business lament, but seem incapable of stemming; and which, when regarded from the point of view of the sacrifice of life, is a slur upon our humanity. It is not necessary to labour these points and to harrow up tales of anguish to impress them. We are all familiar with them, for there are few families in Britain that have not relatives serving in some of these regions of our widespread Empire, and few there are that have not seen the ravages of disease due to conditions of climate upon those returning from abroad.

Disease, Not Climate, the Enemy.

Were these untoward conditions due to "climate" alone, little or nothing could be done, but if there is one thing which the study of tropical diseases

has shown us, it is that disease, and not the climate, is the cause of this crippling of trade, of the necessity for frequent changes "home," involving expense and the employment of a large permanent staff to fill the gaps caused by sickness, and therefore lessening of profits. The legends, a "bad climate," an "unhealthy climate," are wellnigh expunged from tropical literature. All medical men familiar with the Tropics are cognisant of the fact that disease, and, what is more, *preventable* disease, is the cause of the bad name associated with any particular region of the Tropics. And as King Edward shrewdly remarked, "if preventable, why is it not prevented?" We would answer, give the doctors power and control and freedom of action, supply them with the necessary money, and they will free any region of preventable disease; but until the doctors and hygienists have that control the present condition will drivel on with patchwork attempts, which have proved, and ever will prove, disappointing, unsatisfactory, and a mere tinkering with imperial needs and the lives of men.

How to Fight Disease.

To check a disease its cause must be known, otherwise we are working in the dark, and treatment is merely empirical and productive of no permanent good. The cause known (as the causes of many tropical ailments are, as in the cases of malaria, dysentery, yellow fever, plague, sleeping sickness, kala-azar, Mediterranean fever, and a host of others), the attempts at prevention are based on sure foundations, and the doctors can speak with confidence and with authority. But unless the efforts of the doctors are supplemented by an educated public the attempts to enforce hygienic laws become irksome or altogether impossible to enforce. With a public educated in the reasons and meaning of the steps taken to check disease the matter is wholly different. The fight against disease is an enduring one; transgression of hygienic ruling from the days of Moses until to-day has but one end, viz., physical ruin, and in time degeneracy of the individual and of the race. The invasion of Ancient Greece by malaria led to degeneracy of one of the greatest of peoples. It is not improbable that the still greater Roman Empire was ruined by the same fell disease.

Are we to continue to send the flower of our men to countries where these preventable diseases are rife without earnestly striving to counteract their evils? The doctors have shown the causes and the means of spread of these scourges, and all that is wanted now is to give the public the practical lessons by which these scientific researches can be utilized for the public good.

Educate the Public.

The causes are known, the means of prevention are evident, and yet something is wanting to bring the knowledge into the field of practical hygiene. The gap can be filled in only one way, namely, by explaining these means to the individuals who are exposed to the diseases. It is too late to teach

these means after arrival in the Tropics. The infection is often upon the traveller on the way out or immediately upon arrival at his destination, and before there is time or leisure to acquire the necessary knowledge. The instruction must be given before leaving home, and this is the opportunity the College of Ambulance offers.

Women to be Educated.

Besides men, we have to think of women and children in this connection. Unless the women are instructed how to protect their beds and their houses by rendering them mosquito proof, how to keep the compound around their houses free from breeding places for mosquitoes, the fight is hopeless. The children, as well as herself and husband, will fall victims to disease, necessitating their being sent home to Britain and kept at home, leading to the breaking up of family life with the misery and the extra expense of keeping up two homes.

Tropical Ailments in Homes in Britain.

Nor does the subject end with the tropical travellers or residents to whom these classes of instruction are useful; men, women and children are constantly returning home from tropical countries suffering from ailments which are unfamiliar to home-dwellers. It often happens that the children are sent home (whilst the parents have to remain abroad) and placed under the care of the grandparents or other relatives. The children get attacks of fever, diarrhoea, dysentery, &c., ailments which are outside the experience of the relatives, and therefore calculated to cause anxiety owing to their feeling of helplessness, and aggravated by having charge of other people's children; only those who have been thus placed can appreciate what this anxiety is. There are tens of thousands in Britain to-day, and ever will be so long as we remain an imperial people, who have been sent home under these conditions; and there are thousands of anxious women in charge of them who "long" to know something of the ailments from which these children (aye, and their grown-up sons sent home invalided) are suffering.

The College of Ambulance opens its First-aid Classes on Tropical Diseases to them also, for the authorities are well aware of the necessity for this instruction.

We congratulate the authorities of the College of Ambulance on this addition to its first-aid teaching. It has taught tens of thousands of men and women for first-aid at home; but by taking up this branch of first-aid they will be doing an imperial work of vital importance. We hope to hear that this scheme of instruction will be helped, extended, and supported liberally by all those especially who have direct business connection with the Tropics.

ERRATUM.

On p. 205, October 15, 1918, the first column, eighth line from beginning of article, should read "*detail each time the lactose medium is fermented,*"

Abstract.

THE "VITAMINE" HYPOTHESIS AND THE DISEASES REFERABLE TO FAULTY DIET.¹

By E. V. McCOLLUM.

SCURVY.

THE animal with which most of the experimental work has been done with such diets is the rat.

It is possible with a diet consisting of carefully purified protein, starch, a suitably constituted inorganic salt mixture, a small amount of indigestible substance, such as agar-agar, together with a fat that contains the dietary essential fat-soluble A (for example, butter fat) and an extract, either by water or alcohol, of some natural food-stuff (such as wheat germ or yeast) to nourish young rats so as to induce practically a normal growth curve to about the full adult size. The extract must, therefore, contain the one or more unidentified dietary essentials not furnished by the butter fat. Either the butter fat or the extract alone in the diet is not sufficient. If the former is omitted, xerophthalmia will appear, and if the butter fat is included and the extract is omitted, polyneuritis will result. A problem of great interest is to determine whether this extract contains one or more than one indispensable substance. Since rats do not develop scurvy on such a diet, one of two assumptions must be accepted. Either the rat does not require a certain chemical complex, a hypothetical antiscorbutic substance which is necessary for the normal nutrition of certain other species, as man and the guinea-pig, both of which are susceptible to the disease, or the antiscorbutic substance, if there be one, is furnished by the extract in question. To say that all the experimental evidence, which is now extensive, points to the conclusion that the chemical requirements of one species of the higher animals is the same as another is scarcely sufficient to dispose of this view.

Navy beans can be thoroughly extracted with ether, then with benzene, and neither the ether-soluble nor benzene-soluble material has the power to relieve polyneuritis in the rat, when the animals were caused to develop the disease by restricting them to a diet of purified food-stuffs plus fat-soluble A (butter fat). The antineuritic substance (water-soluble B) was not destroyed by this treatment of the beans, as shown by the fact that the extracted beans or an alcoholic extract of the same still caused prompt recovery of the animals, and resumption of growth when added to the diet. Further, when the material which can be extracted by hot alcohol from beans previously extracted with both ether and benzene was spread over a large surface, by evaporating the alcohol on some finely

divided substance, such as dextrin, and the latter then extracted with hot benzene, the benzene-soluble material was capable of inducing prompt recovery of animals suffering from polyneuritis, and of causing them to grow during several weeks. It cannot be argued that the "cure" was temporary in these experiments, for the animals were in a perfectly normal condition when the experiments were discontinued. It follows that, if in addition to the antineuritic substance the benzene extract of the alcohol-soluble material from beans likewise contained an antiscorbutic substance, these, as they exist in the bean, must have both been practically completely insoluble in ether and in benzene, for the extractions were conducted in a continuous extract or for a period of eighteen hours, and that both must have been soluble in hot alcohol, which solvent was likewise continuously applied for a like period. After being removed from the beans by means of hot alcohol, both must have been soluble in hot benzene. The probability that there should be two substances with such unlike physiologic properties, which should agree so completely in their solubility relations, is exceedingly small.

In feeding experiments with rats, a purified food mixture was used consisting of casein, starch (dextrinized), a salt mixture, and butter fat forming 75 per cent. of the food supply, with 25 per cent. of navy beans. The beans were soaked and heated in an autoclave at 15 lb. pressure for an hour and a quarter, dried and ground. The beans furnished the only source of chemically unidentified food substances other than fat-soluble A, which was supplied in the butter fat, and which, as has been stated, bears no relation to scurvy. On this diet young rats grow well and reach the full adult size. According to the commonly accepted views concerning the properties of the supposed antiscorbutic substance, it should be destroyed by such drastic treatment.

A very significant fact in connection with the production of scurvy in the guinea-pig is that the disease develops when the animals are confined to a diet of rolled oats and milk. This diet is highly satisfactory for the maintenance of health and the support of growth in those species of animals which we have observed (rat and swine) with the exception of the guinea-pig. There can be nothing lacking from a diet of oats and milk which is essential for the maintenance of growth and health in the swine and rat, yet the guinea-pig suffers malnutrition promptly when confined to this food supply. In fact, it has been shown that a number of diets which suffice for the nutrition of the rat are very unsatisfactory for the guinea-pig. The latter ordinarily thrive only on diets which contain a succulent vegetable, since its cæcum becomes packed with faeces on diets which are unsuited to its digestive tract. The cæcum in this species is very large and delicate, and such a constipating diet as oats and milk causes malnutrition because of the physical properties of the faeces which are

¹ Abstracted from *Journ. Amer. Med. Assoc.*, September 21, 1918.

formed from it, rather than because of a lack of any antiscorbutic substance.

Recovery of guinea-pigs which were near death is effected by the lubrication of their alimentary tracts by the administration of liquid petrolatum, and by the administration of suitable doses of phenolphthalein, which induced sufficient secretion of liquid into the tract to keep the contents of the caecum soft and capable of elimination. Relief and protection in this species were also afforded in several instances by the addition to the diet of an artificial orange juice, made up of such a salt mixture, sucrose and citric acid, as furnished these in about the proportions contained in the edible portion of the orange.

That the condition characterized by swollen joints, hemorrhages in the knees and elbows and gums was actually scurvy rests on the microscopic examinations of guinea-pigs, who developed the disease when restricted to an oat and milk diet, and on the diagnosis of the disease in animals restricted to an oat diet.

Very important information relating to the etiology of scurvy is furnished by the observations on human infants. The relation of heated milk to the causation of scurvy in infants is the best correlation of the clinical observations that has yet been made, since it harmonizes the conflicting views of various observers, and the conclusions are in harmony with the results of studies on animals fed on simplified diets. Briefly summarized, the data seem best explained as follows:—

One of the factors in the pathogenesis of infantile scurvy is faulty diet. Pasteurized milk is a contributing cause when it is stale, and therefore, not in good bacteriological condition. Ageing of milk, with its development of an abnormal flora, is a more important factor in the production of scurvy than is heating, whether the heat treatment involves only pasteurization or heating to the boiling point. Boiled milk or milk pasteurized at from 140° to 145° F. is less liable to induce scurvy than is milk heated at 165° F. Boiling tends to destroy all the bacteria in milk. Heating to from 140° to 145° F. for thirty minutes fails to destroy all the lactic acid forming organisms, and milk so heated will sour. The souring is a protective process, in that the development of acid holds in check the growth of putrefactive forms, which constitute the dangerous factor in stale heated milks. Milk that has been pasteurized at 165° F. will no longer sour unless reseeded with lactic acid bacteria after the pasteurization process. In clean, well-regulated pasteurization plants this does not happen, but may occur in slovenly managed plants.

Scurvy in the guinea-pig develops as the result of a lack of an antiscorbutic substance in the diet, and this is so unstable that the ordinary drying of cabbage causes its destruction; the oat kernel lacks this antiscorbutic substance. Rolled oats can be supplemented with pure protein (gelatin), an inorganic salt mixture, and butter fat, so as to render it capable of satisfactorily nourishing young rats

from weaning time to full adult size, growth taking place at the normal rate. Butter fat has no tendency to protect the guinea-pig against scurvy. It must follow that the oat kernel contains a satisfactory amount of antiscorbutic substance, provided the rat requires such a complex. The fact that the guinea-pig, when fed this diet of oats and purified food additions, rapidly fails necessitates the assumption that the guinea-pig requires a chemical complex not necessary for the normal nutrition of the rat, or the abandonment of the view that an antiscorbutic substance exists.

One of the common symptoms of scurvy is oliguria, and the mild therapeutic effect of citric acid may be ascribed to its diuretic properties. In infants orange juice has a diuretic effect. This is an important observation which should aid one in appreciating the fact that the organism may react with the development of profound pathologic states, such as constitute the most prominent features of scurvy, from causes other than a specific starvation for a hypothetical antiscorbutic substance. Injury to the mucosa of the digestive tract may be brought about through diets of faulty physical character, in such an animal as the guinea-pig, because of the peculiar disability of this species due to the unfortunate anatomy of its digestive apparatus. Stagnation of the contents of the caecum are followed by abnormal decompositions, and contact of the mucosa with these may be reasonably held to cause injury. It is not necessary to assume the invasion of the body by organisms as a factor in the causation of scurvy, although this may take place. The absorption of abnormal decomposition products of proteins under these conditions may be chiefly responsible for the changes observed. The observation that there is no increase in the excretion of phenol in guinea-pigs fed on an oat diet can have but little bearing on the extent to which protein is undergoing fermentative decomposition in the digestive tract of the animal, since phenol production is limited by the yield of aromatic amino-acids by the proteins which are being putrefied. The characteristic result of acute anaphylactic shock in guinea-pigs is the appearance of hemorrhages. Undoubtedly infection is the most important factor in the cause of nephritis in man, a view that has gained wide acceptance within recent years.

Recovery from scurvy following a change of diet, or an improvement of the bacteriologic condition of the food, or following the administration of substances having diuretic properties, may be more satisfactorily explained in other ways than by the assumption that such changes in the dietary regimen produce their effects because of the introduction of a hypothetical antiscorbutic substance. It is necessary, henceforth, that those who discuss the etiology of scurvy should take into consideration the results of recent researches in nutrition with simplified diets. Whoever would seek to establish the validity of the theory of the existence of a specific antiscorbutic substance should first furnish

new explanations for the experimental results that are not in harmony with the antiscorbutic theory, rather than present new experiments that harmonize with this most attractive hypothesis.

PELLAGRA.

One of the greatest public health problems, a practical method for the prevention and treatment of pellagra, has been solved. There remains little room for doubt that faulty diet is the primary factor in the causation of the disease, and that the inclusion of an abundance of milk in the diet will prevent an attack, or cause recovery. It should be mentioned here that it is not possible to secure diets derived solely from the seeds of plants, together with tubers and edible roots, which will adequately nourish either a young animal during growth or long maintain health in the adult. Even mixtures of these food-stuffs, together with liberal amounts of meat (round steak), fail to induce satisfactory nutrition in the growing young. There are, as is shown by their investigations, but two types of food mixtures which give very satisfactory results in the nutrition of experimental animals. These are: (1) Combinations in which seeds, tubers, edible roots and meats are either singly or collectively combined with suitable amounts of the leafy portion of the plant, and (2) combinations of seeds, tubers, roots, meats and leaves, singly or collectively, with liberal amounts of milk.

The vegetable foods listed under 1 are, with the exception of leaves, all structures whose functions are those of storage organs. They consist principally of a reserve food package of proteins, starch, sugars, fats, and mineral salts, but in the germ of the seed, and certain areas in the tuber and root, there are cellular structures which constitute actively metabolizing protoplasm. The leaf, aside from its skeletal tissues, is rich in cells, and a large part of it is active protoplasm. There goes with this difference in function between the leaf and the storage organs a corresponding difference in dietary properties. Seeds, tubers, and roots, and probably likewise fruits, are deficient in three respects from the dietary standpoint. In all cases they are too poor in three inorganic elements—namely, calcium, sodium, and chlorine; they do not contain a sufficient amount of fat-soluble A, and their proteins are of relatively low biologic value as compared with those of milk, meats, and eggs. The leaf of the plant and milk are so constituted as to make good these deficiencies, when they are included in the diet in sufficient amounts. It is for this reason that I have recently introduced the term *protective foods*, to designate milk and the leafy portion of the plant. Meats supplement seeds, tubers, and roots with respect to protein, but not efficiently with respect to the other deficiencies. Eggs should be classed with milk in their special food properties, but are not so rich in calcium when the shell is discarded. It has been found that the diets of the peoples in those districts in which pellagra is found is derived in great measure

from seed products, tubers, and meat, principally fat pork. For an experimental attempt to produce pellagra in man, a diet was selected consisting of bolted wheat flour, degerminated corn meal, polished rice, sugar, starch, syrup, pork fat, sweet potatoes, cabbage, collards, turnip greens, and coffee. I have calculated that about 95 per cent. of the total dry matter of this diet was derived from the endosperm of seeds and pork fat. There was present entirely too small an amount of the leaf (the sole *protective food*) to correct the faults in the rest of the food mixture.

In order to determine whether there is lacking from this list of food-stuffs any chemically unidentified food essential analogous to fat-soluble A and water-soluble B, the mixture was fed to rats, and in a series of experimental animals the same diet was fed supplemented with single and multiple additions of carefully purified food-stuffs. It has been shown that it is possible to supplement this diet with known food principles, so as to make it sufficiently complete from the dietary standpoint to enable young rats to grow at a fairly good rate and to remain in a state of health. It seems necessary to conclude from that the faults in such diets as are derived largely from seed products, tubers, molasses, and fat meat have essentially the same kinds of deficiencies as have seeds generally; but in diets in which the endosperm of the seeds predominates (polished rice, bolted wheat flour, degerminated corn meal) the deficiencies are much more pronounced than would be the case if the entire seeds were employed. Each of the more important cereal grains have been shown to require three kinds of additions to make them dietetically satisfactory. These are the inorganic elements calcium, sodium, and chlorine, a protein, and fat-soluble A, the unidentified dietary essential which is most abundant in butter fat and the fats of the egg yolk.

In dogs a condition closely resembling pellagra in man is caused by restricting the animals for periods varying from two to eight months to a diet consisting of peas, crackers (equivalent to bolted flour), and cotton-seed oil. Sloughing of the mucosa of the mouth, diarrhoea, ulceration of the gastric mucosa, and skin lesions are observed, caused probably by the lack of some unidentified dietary essential of the class which Funk designated as "vitamines."

This diet can be supplemented with carefully purified protein, the salts, calcium carbonate and sodium chloride, and butter fat (fat-soluble A) so as to make it sufficiently complete to enable young rats to grow from weaning time to full adult size. This proves that there is no deficiency in this diet other than in the three now well recognized dietary factors. Rats that were brought to a moribund condition as the result of restricting them to a diet of peas, wheat flour, and cotton-seed oil showed at necropsy an apparently normal condition of the mucosa of the mouth and intestine. There was no diarrhoea, and there were no skin lesions suggestive

of pellagra in man. Partial loss of hair was observed.

Study of the conditions in those parts of Nashville where pellagra occurs lead to the conclusion that the disease involves an infection, being especially prevalent in those districts where sewage disposal does not exist, and where flies have free access to human excreta, and the houses are unscreened, that the disease is caused by infection. The diet of pellagrins is derived during the greater part of the year from seed products, tubers, molasses, and fat meat. It is at the end of winter, after several months on a restricted diet of this character, that the new cases and recurrences of old cases occur. During the summer, when green vegetables are obtainable, and the milk supply is better than during the winter, recovery takes place.

It cannot be definitely stated at present whether man will react to the continued restriction to such diets as those described, with the appearance of the syndromes characteristic of pellagra, without the agency of an infection. The infection theory cannot be dismissed at the present time, but it seems certain that if pellagra is the result of infection, the latter is always super-imposed on a certain degree of debility that results most frequently from the adherence for a considerable period to a diet of a faulty character. It seems practically demonstrated that the faults of the diets that lead to the appearance of the disease are not due to the absence of any unidentified dietary essentials, but rather to poor quality with respect to three of the well known dietary factors.

Notes and News.

AN INTERESTING EAST AFRICAN INDUSTRY.

MAGADI, which in the native dialect means soda, is situated in British East Africa, sixty miles south of Nairobi. This vast crystalline deposit, covering thirty square miles at the bottom of the great Rift Valley, contains the purest quality of natural soda that is known to exist.

The supply of this solid natural soda is inexhaustible. There are about 200 million tons now actually exposed, and the hot springs are continuously adding to the quantity.

Magadi natural soda, which is a sesquicarbonate of soda of remarkable purity, is specially distinguished by being free from sulphate of soda and caustic impurities: it can therefore be safely and economically used for all purposes, including those for which manufactured soda products such as pure alkali (soda ash), soda crystals, and other carbonates of soda are at present employed.

The natural soda is a very stable substance, quite unaffected by heat or climate, and is won from the deposit in crystalline blocks, which, after drying, are crushed or ground to powder and then packed

in bags for export. The powder is of excellent colour, readily soluble in water, and is not injurious in any respect.

USES.

Commercially, pure natural soda is an entirely new commodity. It is a chemical compound with distinctive properties, that render it particularly adapted to certain purposes, especially washing, when its use results in a large saving of soap.

Natural soda, on account of its cheapness and valuable qualities, can also be recommended as a substitute for other forms of sodium carbonate, such as soda crystals (ordinary washing soda), pure alkali (soda ash), bicarbonate of soda. In place of this article Magadi natural soda can be utilized, when treated with sulphuric acid, as a cheap source of pure carbonic acid gas. For its aerating properties it is greatly superior to whiting and chalk, and can be strongly recommended to mineral water manufacturers.

Magadi natural soda is also suitable for many household requirements, and to show how wide and varied such uses are, it may be mentioned that it is being sold in large quantities in Africa and India not only for washing, but also as a snuff and as a chew with betel nut and as an improved "salt-lick," which, in block form, is given to cattle, rapidly improving their condition.

The Magadi Soda Co., Ltd., have constructed a railway of ninety-one miles to connect with the Uganda Railway, which has its terminus at Kilindi (Mombasa), whence the soda is shipped. The company have their depot and deep water pier at that port.

Separation of Trypanosomes from Blood in Antigen Preparation (F. H. Reynolds and H. W. Schoening, *Journal Agricultural Research*, 1918, p. 573).—By the plan recommended by the authors the blood of inoculated rats is collected in citrated saline and then strained through muslin and centrifuged for twenty minutes at 2,000 revolutions. The clear liquid is drawn off and centrifuged again to recover any trypanosomes present. The first deposit, consisting of corpuscles and trypanosomes, is agitated with distilled water for twenty minutes until the red cells are completely laked. The liquid is then centrifuged for half an hour when the trypanosomes are all collected at the bottom of the tube. The liquid is poured off and the deposit is washed with saline and centrifuged. The saline is rejected and a preserving fluid consisting of glycerine and saline is added to the trypanosomes, and the mixture is stirred well to produce a uniform emulsion. This is stored on ice.

Comparative tests were made of the antigen prepared by the new method and one prepared by the present method. It was found that the use of distilled water to lade the corpuscles had had no detrimental effect on the trypanosomes with regard to their antigenic value, and that their anticomplementary action was diminished.

Original Communications.

THE ETIOLOGY OF SPRUE, PELLAGRA, AND SCURVY.

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SPRUE, pellagra, and scurvy have much in common with one another, and although doubtless they are distinct morbid entities, yet cases of pellagra occur which are almost indistinguishable from cases of sprue and others arise which closely simulate scurvy.

Few observers have had an opportunity of an extensive study of these diseases. I had the good fortune, when I was stationed in the West Indies, to have a close clinical experience of pellagra and to perform a number of post-mortem examinations on bodies of patients who had died of this disease. I have seen and treated in East Africa several hundred patients who were afflicted with a disorder closely allied to pellagra which had broken out among native labourers who were employed on railway construction work, and during the recent campaign in that country I saw many cases of scurvy among the African and Indian troops. Finally, during the last two and a half years I have studied and treated a number of patients suffering with sprue.

Most of the circumstances connected with sprue support the view that it is caused by the infection of a micro-organism, whereas scurvy is more or less dependent for its appearance upon a lack of some necessary constituents in the diet, previously consumed by the sufferers; in these respects pellagra falls midway between these diseases, and for every suggestion that it is an infectious disease, a contrary opinion exists that its etiology is explained by the nature of the patient's antecedent diet.

Many facts will remain anomalous if we suppose that the sole causes of these diseases are dietary errors, but they may be the predisposing causes which lower the resistance of the alimentary mucosa to germ infection, and enable a definite micro-organism which is always present, and is normally of low pathogenicity, to invade those structures.

Predisposing causes are usually of a general and an indefinite nature, but here we are dealing with one which is probably very definite, and this is the important point.

I believe that no cases of these diseases will occur unless both factors are present to some extent, but it must be remembered that the deficiency in a diet may be greater or less; and the degree of pathogenicity of an organism and the resistance to it varies.

The latter is the predominant factor in sprue, and the former in scurvy, but they are fairly evenly balanced in pellagra.

Fig. 1 graphically represents my conception of

the relative degree of action of these factors in the average case of sprue, pellagra, and scurvy.

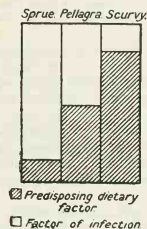


FIG. 1.

A number of cases of sprue arise where it is difficult to believe that the patient's diet had been erroneous. On the other hand, outbreaks of scurvy which have occurred in ships, where the sailors have been deprived of proper food for a long time, appear to be explainable on this basis alone. These represent the two extremes, which, together with the other variations in each disease, I have attempted to represent graphically in fig. 2.

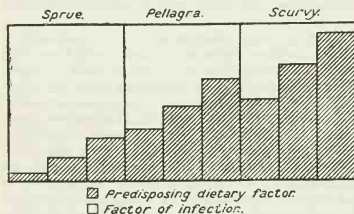


FIG. 2.

Now that I have briefly stated my views of these diseases, it is necessary to consider their points of similarity, the nature of the supposed organisms, and the dietary error, and to bring forward evidence to support these opinions.

The early symptoms and signs of sprue are referable to the alimentary tract, the patient is dyspeptic, the tongue becomes sore, and there is superficial denudation and ulceration of the mucous membrane of the mouth; the tongue soon acquires the characteristic red, clean, glazed appearance, with small patches of deeper ulceration; diarrhoea sets in, and the stools become cream-coloured, voluminous and frothy from adventitious fermentation. Oesophagitis is an early and fairly constant phenomenon.

The onset of pellagra may be very similar, but the appearance of the stools is usually quite different.

Soreness and inflammation of the gums is an early symptom of scurvy, but diarrhoea is not present in the first stages of this disease.

Broadly considered, pyrexia is absent in these maladies.

Skin eruptions do not, as a rule, occur in sprue, but there is a tendency for the skin of the forehead, the back of the hands, and other exposed surfaces to become rough and acquire a mottled pigmentation.

Dermatitis of the uncovered surfaces of the body is a well-marked sign of pellagra, and is due to injury from the sunlight.

Irregular purpuric patches appear in scurvy after slight injuries.

The dementia and neuritis which afflict persons suffering from pellagra are not present in sprue or scurvy.

The changes which occur in the muscles, joints, and periosteum in scurvy, and which are due to hæmorrhages, do not appear in the two other diseases.

In the three disorders extreme emaciation takes place.

Sprue in its several forms is almost confined to Europeans who live in tropical countries, and whose mode of life and diet have undergone considerable changes. Pellagra afflicts the poorer classes, and appears most frequently among those whose principal food is maize.

There is much resemblance in the pathological changes in these diseases. Persons who have died of sprue or pellagra have wasted to such a degree that starvation might be suspected to be the cause of death. All the organs of the body are shrunken, especially the liver and spleen; thus in two post-mortems conducted by Bahr on bodies of persons who had died of sprue, he found that the livers weighed 25 oz. and 24 oz. respectively, and the spleen was 1½ oz. in both cases. In a series of post-mortem examinations of pellagrous subjects in St. Lucia, I found that the average weight of the liver was 37½ oz. and the spleen 3 oz., and the smallest spleen from an adult weighed only 7 dr.!

In both diseases the mucous membranes of the digestive tract, with the exception of the stomach and sometimes the large intestine, have undergone attenuation, superficial erosion, and cellular degeneration. The other coats of the small intestines also are diminished, so that the gut wall is diaphanous to the extent that small print can be read through it.

The appearance under the microscope of sections of the tongue, œsophagus, intestines, liver, and spleen are similar in the two diseases: there is cellular degeneration and atrophy, stenosis and capillary hæmorrhages; the latter are shown by the presence of extravasated red blood corpuscles and pigment in the organs.

If there is any difference in the microscopical findings in these diseases, it is one of degree in that the occurrence of capillary hæmorrhages is far more

marked in pellagra than in sprue; in this respect pellagra resembles scurvy.

The degenerative changes in the nervous system and the skin eruption in pellagra have no counterpart in sprue, but probably they are caused by capillary stenosis and hæmorrhages occurring in these structures. The pathological changes in scurvy are explained by the hæmorrhagic tendency which causes a continual leakage from the smaller vascular channels.

It is logical to suggest that the early pathological changes which appear in the digestive tract in these diseases are initiated by the infecting organism, and the later changes from normal which take place in the tissues may be explained by a difference in degree and some dissimilarity in the action of the two causative factors.

A study of mild attacks of sprue and the maiady in its early stages is likely to be fruitful for establishing its etiology.

Stomatitis and œsophagitis of a mild nature, but exactly similar to the condition seen in Europeans suffering from sprue, is common among the natives of Ceylon, but apparently these people possess a racial immunity, for the disease rarely progresses or infects the lower portions of the alimentary tract, consequently the later stages are seldom seen in Cingalese.

The only culturable organism which is always present in this disease is *Streptococcus viridans*.

Occasionally sprue appears in a European with a sudden onset, and on one occasion I had the opportunity of making cultures from the tongue of a patient only a few hours after the onset. The patient had been in good health, when one morning he found that he could not eat his breakfast or smoke because of soreness of his mouth. Knowing that I was interested in sprue, he visited me the same morning. I took scrapings from the tongue and smeared them upon blood agar, glucose agar, and glycerine agar; of the colonies which appeared a few were staphylococci and diphtheroid bacilli, but the vast majority were *S. viridans*.

I have reported elsewhere that the serum of persons suffering with sprue has more power of fixing complement when streptococcal antigens are used than the serum of persons in natural health.

Sir Leonard Rogers [1], in India, has obtained extraordinary results from the treatment with streptococcal vaccines of patients suffering with sprue. I have had similar results in Ceylon; and some of these patients had been ill for a year or more, and had received various treatments without success. The rapid manner in which improvement started supports the opinion that a streptococcus has an etiological rôle in this disease.

Therefore it is suggested that one factor in sprue is an invasion of the superficial layers of the mucosa of the alimentary tract by a streptococcus of low virulence, and which has a selective affinity for this situation.

At present this streptococcus cannot be distin-

guished morphologically or culturally from the *S. viridans*, which usually can be isolated from the normal mouth.

At times it has appeared that the etiology of scurvy may be stated as a single factor—namely, that it is due to a deficiency of some necessary substances from the food, and that these constituents disappear slowly from food which is stored or preserved.

Doubts have been expressed frequently in medical writings that a deficiency of certain substances from the food does not sufficiently explain this disease.

After numerous experiments with animals, Morpingo [2] and Kock [3] suggested that streptococci are the sole cause of scurvy.

Myers Coplains [4], after his experience of scurvy, when he was in medical charge of concentration camps during the Boer War, brings forward evidence in support of the suggestion that scurvy is an infectious disease.

Leila Jackson [5], in a recent paper on the "Demonstration of Micrococci in the Bones in Rickets and Scurvy," sums up: "Even should we subsequently decide that these organisms are but secondary invaders, it still seems that the evidence presented by the microscopic preparations of the lesions argues for the presence of some infectious agent, and emphasizes the need of further work on the bacteriology of these conditions."

Scurvy often breaks out among Indian and African troops when they are on campaign. Many cases have appeared in East Africa and in Mesopotamia during the War, and previously they have been common in frontier wars in India.

I have met several surgeons in the Indian Medical Service who have stated that scurvy is preventable and curable by strict attention to mouth cleanliness, and that troops should be examined at intervals for pyorrhæa alveolaris and septic mouths, and these attended to as a preventive of scurvy.

Undoubtedly it is impossible to account for many outbreaks of scurvy entirely on the supposition that there has been a food deficiency.

Numerous papers have recorded a large amount of work which has been done with streptococci in recent years. A study of these shows that, morphologically, culturally, and serologically, these organisms are very inconstant and variable, hence it is necessary to adopt broad views concerning their nature.

Marmorek, who studied the cross agglutination reaction of various streptococci, believed that they were all of the same species. Other workers have agreed with this, and considered that the cultural reactions vary according to the circumstances under which each organism is existing or has recently existed.

Several observers believe that transmutations take place in a short period of time. Thus Davis [6] writes: "Transformation of one member into another within certain limits appears to be not an uncommon phenomenon."

Rosenow [7] reports that he has converted

hæmolytic streptococci from a wide range of sources into *S. viridans*, typical pneumococcus even into *S. mucosus*, and further, he states that this takes place even when the cultures are made from a single coccus according to the method of Barber, and thus working from a "pure line" he avoids "mass selection."

There are several possible sources of error in his work which cannot be discussed here.

Probably bacteria can possess but a limited range of properties, and that with them further evolution cannot take place, in which case we must assume that they show variations at different times because a varying number of these properties are dominant or recessive.

But if they possess powers of evolution, it would be expected that in a short time they would give rise to fresh species with a selective affinity for that part of the human body which for the time being had become suitable as a habitat for them; for a study of evolution and palæontology proves that many forms of life have been evolved from more primitive species in less generations than most bacteria are capable of producing in a year.

S. viridans, indistinguishable from the organism of normal mouths, is a cause of endocarditis, and if this organism from the healthy mucous membrane or from various lesions is injected intravenously into rabbits, it may produce endocarditis, myositis, or arthritis.

Heinemann [8] has described two strains of streptococci isolated from milk, indistinguishable from one another as to form and cultural characters, which, nevertheless, were quite different, as shown by intravenous injections into animals, one localized in the muscles and joints and the other in the gall-bladder.

Moody [9] has shown that streptococci from alveolar abscesses which are identical culturally differ widely in their degree of virulence for laboratory animals.

These organisms can often be cultivated from the blood of persons dying of various affections, or they may be isolated from the internal organs immediately after death, and this demonstrates their ever readiness to invade the body.

Pneumonia occurs in all parts of the globe, and little doubt exists that we possess correct knowledge of the essential factors of the etiology of this disease. In cases of pneumonia we do not expect contact with previous cases.

Any one of several organisms which live in the throats of persons in normal health may cause pneumonia, but unless a chill or some other predisposing cause lowers the immunity these organisms will remain harmless. Yet there are outbreaks of pneumonia in which the pneumococcus has increased in virulence sufficiently to enable it to invade the lungs when the predisposing factor has been reduced to a minimum.

There is also an analogy between the common septic processes and the diseases with which this paper is concerned.

When the tissues of the body are injured we are

not surprised that purulent processes supervene, for we recognize that a large number of micro-organisms usually associated with the body are ever ready to invade the tissues as soon as the resistance of these is lowered, also these organisms at times become very virulent, so that the manifestation of the disease may range from the production of a single bead of pus to a rapid septicæmia which kills the patient in forty-eight hours or less.

The conception that a normal inhabitant of the alimentary tract becomes exalted in pathogenicity from surrounding circumstances and succeeds in invading the mucous membrane, the resistance of which has been lowered by a definite cause, can in no way be considered to transcend our bacteriological experiences.

It is noteworthy that sprue is more or less confined to equable, humid, and warm climates and to thickly populated places; the majority of the population is addicted to the habit of chewing, and consequently the repulsive habit of spitting, and thus there is every chance of streptococci being continually passed from one person to another whose mouths have been irritated by the chew.

It is not unreasonable to suggest that in some such manner streptococci may increase in virulence and acquire an elective affinity for the alimentary mucosa.

Our knowledge of dietary necessities of the animal economy is deficient, and we know nothing of what constituent is necessary for each organ for the elaboration of the various chemical components of the body which are necessary for the proper manifestation of the vital functions.

It may be that certain of the so-called vitamins are essential for the production of proper immunity to bacteria, and when these are reduced below a certain level, organisms which cannot invade the normal body may play a pathogenic rôle.

Thus a vicious cycle would be established, for still more vitamins now becomes necessary to produce sufficient antibodies for the destruction of the invader, and when the invasion takes place in the alimentary tract the functions of digestion and absorption are impaired, and this lessens the supply of proper food for the tissues, and also allows numerous adventitious organisms to flourish in the gut, and toxins produced by them may give rise to some of the symptoms of these diseases.

I believe that these views of sprue, pellagra, and scurvy are sufficiently concise to stimulate inquiry along these lines.

Further, it is possible that some of the unelucidated fundamentals of such diseases as beriberi may be explained in like manner.

A streptococcus appears to be the infecting agent in sprue, and very probably in scurvy also. But it would not be surprising to find that some other class of organism was the secondary factor in pellagra.

Vaccines have proved to be valueless in the treatment of disease caused by organisms of high virulence, but when the organism is of low patho-

genicity and the disease is apyrexial at most stages throughout its course, and there is no profound destruction of tissue or the formation of fibrous elements which protect the germ from the fluids of the blood, it is probable that vaccine treatment will stimulate the formation of antibodies sufficiently to produce a curative effect. But where two factors are in evidence the predominant one may require the greater attention.

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A CASE OF SPRUE ASSOCIATED WITH TETANY.

By P. W. BASSETT-SMITH, C.B., C.M.G., R.N., F.R.C.P., F.R.C.S., D.T.M. & H.

THE onset of tetany in association with diseases of the digestive system has been not infrequently noted, but it has not before been recorded in a case of sprue.

The patient, a male, aged 45, originally contracted the disease while on the China station in 1911-13, probably at Shanghai. He had suffered from many relapses of diarrhoea and sore tongue, but more frequently during the past two years. In July, 1918, he was admitted to the Royal Naval Hospital, Plymouth, for chronic colitis, and the disease as then diagnosed as sprue, the stools being pale, bulky and fermenting. He was extremely emaciated and debilitated, and weighed 84 lb. On September 19, 1918, he came under my charge at the Dreadnought Hospital, Greenwich. The condition then was that of a typical case of sprue in its last stage. The temperature was sub-normal, pulse 74, respiration 24, and his mental condition was clouded, but he was generally very cheerful. There was intense emaciation, dry skin, with increased pigmentation around nipples, scrotum, face, and axillæ. The conjunctivæ were pearly white, tongue dry and glazed, but no ulceration was present, the abdomen was distended, peristalsis very active and easily stimulated. The stools were semi-solid, pale yellow, abundant, offensive, but not fermenting. The urine showed a trace of albumin. There was no œdema, petechiæ, or sores. The systolic blood-pressure was 95 mm., and the pulse of low tension. Examination of the blood showed red cells, 1,480,000, and white cells, 3,200, with a relative count of polymorphs, 61 per cent.; lymphocytes, 34 per cent.; mononuclears, 3 per cent.; and transitionals, 0.2 per cent. The blood picture was that of a severe secondary anaemia without nucleated reds. Under treatment he showed signs of improvement, but on September 23 he

complained of slight cramps in right hand and wrist. These were relieved by warmth. On the morning of the 24th he felt well but for the cramps, and passed a large fermenting stool; at midday definite tetany set in, chronic spasm of right hand, fingers, wrist, and forearm. The deep reflexes were lost, but the muscles reacted. The condition rapidly became worse, with collapse, intense pain and sweats, the spasm spreading up the arm and across the chest with a marked trismus, typical risus sardonius, and the right leg was slightly affected. The bowels acted involuntarily. Oxygen was administered, and an ether injection given subcutaneously, and also a turpentine enema. At 2.30 p.m. the trismus had passed off and he felt much better, but the hand was still clenched. At 3 p.m. he was taking food and felt more comfortable, but was very weak. Calomel was given with Dover's powder, and he was ordered a course of thyroid extract. There was no return of the tetany, but the general condition did not improve, and on October 3 slight pyrexia with pulmonary symptoms came on, and he died on the 7th quite quietly in the night from heart failure, apparently free from pain.

Post-mortem showed a complete absence of fat in the tissues; the heart (5 oz.) was very small, and superficial white patches were present. The intestines contained much soft faecal material. On examination of these no ulceration was found anywhere, but the walls were very thin, especially those of the lower part of the jejunum and ileum. The mesenteric glands were enlarged. The spleen was small and free from adhesions and weighed 1½ oz. The liver appeared normal, weighing 3 lb. The kidneys were both large, pale, and weighed 4 to 5 oz. The pancreas appeared normal, and the thyroid was atrophied. The left pleura was adherent throughout, and both lungs showed intense oedema, most marked at the bases.

A microscopic examination of the organs was made. The liver showed a slight amount of interlobular cirrhosis. In the kidneys there was some evidence of chronic tubular nephritis, but no infarcts or hæmorrhages. The lungs showed hæmorrhagic and catarrhal infiltration of localized areas. The pancreas appeared to be normal. Sections of the small intestines showed atrophy of the villi with a small-celled infiltration in the submucosa, and in this layer were a number of stout, oval, and slightly curved, rather large Gram-positive bacilli, but no evidence of yeast-like cells could be found.

The chief interest in the case lies in the severe attack of tetany, which came on late in the disease from no apparent cause other than some intestinal irritation, its unilateral character as far as the limbs were concerned, and the severe bilateral trismus, the extreme emaciation of the patient making the contracted muscles stand out more prominently even than usual. The rapid action of the subcutaneous injection of ether in relieving the spasm is noteworthy.

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THE JOURNAL OF

Tropical Medicine and Hygiene

FEBRUARY 1, 1919.

ALCOHOL: EFFECT IN TROPICAL COUNTRIES: PROHIBITION: USE OF ALCOHOL IN INFLUENZA.

"I HAD to take *something* when I was made an officer and joined the mess," was the remark of a lad of twenty summers, who, joining as a private in the Army, was subsequently raised to the rank of

an officer. The remark that he *had* to take something may be true or not, but, in any case, it shows what is expected of him, or, perhaps it is safer to say, what he imagined was expected of him. He avoided spirits and drank port, with the result that he developed a chronic conjunctival congestion, a "dry" eczema of the face, &c., &c.

How frequently is a remark of the kind heard, not only in the Army, but also in civil life, as well as in other public services where a mess obtains. A young man returning invalided from, say, a five years' spell of work in a tropical climate, be his work in an office or in the open air, whether in Government or other service, when asked by his doctor "What do you drink?" or "Do you drink much?" "Oh! you know what it is in the tropics, five or six whiskies a day." Inquiry soon betrays the fact that he has stated an amount considerably below that which is taken, and it is only when the actual amount enumerated item by item is revealed to him that he realizes how much he has taken, so accustomed is he "to have a drink."

The taking of alcohol has become a habit in tropical countries amongst Europeans, and to such an extent has it become established that few there be who do not follow it.

That the habit is recognized and deplored by the majority of men in the Services, be it in the Army or Navy, is well known; the seniors have learned wisdom as a rule in the matter of stimulants, but the younger men who join, gathering that it is "the thing to do," and who, perhaps, never had touched spirits before joining, fall into the routine. To them moderation is more difficult, and the amount taken is apt to grow to excess out of a spirit of bravado, and to show that they are no longer boys.

For the planter on a lonely station, or the merchant in an isolated district where "there is positively nothing to do" after the day's work is done, the drinking habit, however excusable, is apt to increase to a detrimental amount. All this is known, and the evil effects are likewise recognized, but how to break away from the habit is a matter that seems well nigh impossible. To preach self-restraint to a lad of two or three and twenty is well nigh useless, and the question becomes one of serious import. That it is a serious question no one can deny; that it brings about a breakdown in health, detracts from the efficiency of the worker, causes expense to the employer by necessitating more frequent changes "home" than otherwise would be the case, are but truisms patent to everybody. Yet does the evil go on. It seems nobody's business to interfere, nor is any man apparently ever willing to speak to another about drink, or to say he drinks too much, either to the man himself, to his wife or relations, or to his fellow men. We may joke about it, refer to his "complexion," &c., but to earnestly attempt to stem the man on his downward path is seldom thought of until the matter becomes a scandal, or he proves incapable of work. The doctor gets no thanks for drawing attention to the evil. If he mentions the matter to his wife he gets as a rule abuse, and

perhaps threatened with an action for libel; if he mentions it to the man's sister or brother it is resented with similar threats, and even were the doctor to report the fact to the head of the bank, firm, or estate, it is apt to be glossed over with "Oh! he's a good chap and wants a change." He does want a change, but not a change to doing nothing, during which he has more opportunity to indulge in his vice and health-destroying propensity. Then what is to be done? No one has solved the problem, the law does not help; he must go *voluntarily* to a house of detention for drunkards. How many of the weaklings, saturated with alcohol and the mental aberrations it generates, have courage sufficient to confessedly own their delinquencies by seeking shelter in an asylum of the kind? How many will be permanently benefited by undergoing the "treatment"? more often conducted by a charlatan with some quack remedy than not.

But this "treatment," be what it may, comes late in the disease and too late to cure. It is prophylaxis that is wanted, not "death-bed repentance." And in what direction does prophylaxis present any hope? Total and lasting prohibition is the one and only form that is held out to us. This may be attempted by the State, as in the United States of America, where a "dry" America is proposed and seemingly about to be brought into being. If this is to be imposed on Great Britain the law will hold good in all our Crown Colonies and Protectorates, for these are under the same laws as in Britain itself. In many of these Crown Colonies it is illegal to sell drink to natives—a law more frequently followed in the breach than in the observance. For the benefit of our race it would be well were the rule made for the benefit of the natives made to cover the British in these distant lands as well, for they want protection in this matter more than the usually soberly inclined natives. The governor and legislative council who will have the courage to banish spirits entirely from the colony they legislate for will incur abuse from the members of the local so-called club, which is nothing, in many instances, but a public-house under a higher sounding title, just as many of our working men's clubs in Britain are mere pot-house bars. In the meantime in many of our Crown Colonies liquor of all kinds is admitted free of duty, a condition of affairs that fosters an evil which is already too widely spread.

Whilst thus pouring forth the "vials of one's wrath" upon the subject the writer begs to say at once that prohibition as in America is foreign to his thoughts. Surely British folk do not wish to think they have sunk so low in their own estimation as to require to be thus shepherded, or to require such drastic measures imposed upon them to protect them from their weakness, as the burning of the opium chests in Shanghai betrays. These are confessions of weakness, not of strength of character, of want of self-control, without which neither a people nor an individual can be great. Are we, the foremost of people, so morally weak that "legislation" is required to protect ourselves from ourselves from this or any

other vice. It is not of such stuff that a great race is made and maintained; and we hope to see none of such unnatural legislation. Were excess in drinking condemned as it should be by fathers, mothers, relatives, employers, neighbours of the person who is known to drink to excess, and the man regarded as a social outcast, dismissed from employment, imprisoned or sent to a lunatic asylum forthwith, punished, in fact, as other crimes are punished, the drink habit would become a rarity amongst us. Drunkards we would still have, as we have thieves, bolsheviks, murderers, and other criminals, but with the law for the drunkard placed on the same footing as these, or the drunkard regarded as a lunatic and confined by law in an asylum, we would purge our land of the evil, and without letting it go down to history that the foremost people of the earth in the Twentieth Century were so addicted to alcohol, and sunk so low in self-discipline, that they had to prohibit the sale and manufacture of alcohol in any fashion. Let us see to it that this threatened blot on the escutcheon of our race is warded off, but it can only be avoided by every one combining to punish this social outcast by such means that public opinion and legislative power may bring to bear on it.

When on this subject there is another side to it. Alcohol, be it whisky or brandy, is so difficult to obtain at present in the British Isles that it is not even obtainable by doctors' prescription. The chemists cannot get it, therefore cannot supply it to patients for whom it is ordered by their doctors. The chemists have to send round to the public-houses in their endeavour to obtain the drug so as to comply with the doctor's order.

At present influenza is prevalent, and the absence of spirits, especially of whisky, is a great gap in the armamentarium whereby the scourge can be fought. Alcohol is the most important drug we have to fight the physical and mental condition influenza induces. It is not, however, obtainable, and the terrible death rate is high in consequence. In the pan-demic of the nineties spirits were found to be the only drug of value, and the death rate was as nothing compared with the present. To the impossibility of the chemists being able to comply with the doctors' prescriptions tens of thousands of deaths are due. Legislation and prohibition may degenerate into faddism, as it evidently has at the present moment, when the doctors' orders are impossible to fulfil and the people die in consequence.

Annotations.

Action of Pathologic Serum on Photochemical Processes (H. Haxthausen, *Hospitalstidende*, vol. lxi, No. 20).—Haxthausen remarks that hematoporphyrin, some element in maize, and a certain kind of buckwheat are the only substances that to date have been directly incriminated in the production of certain skin affections traced to the action of sunlight, hydroa vacciniforme, etc. But there is evidence to prove that many substances under certain circumstances may have a sensitizing action on the skin. He has been studying the blood serum of patients with solar eczema or Hutchinson's prurigo restricted to the exposed portions, face, hands and forearms. The most easily studied photochemical process in the blood is the hemolysis by light, and his tests showed there is a much higher hemolysis index in the serum of persons with this polymorphous light dermatitis than in normal serum or in serum from other forms of dermatitis. The difference is most marked the stronger the concentration.

Complications of Malta Fever (Camacho, *Progresos de la Clinica*, vol. vi, No. 68).—Camacho remarks that Malta fever is endemic in Granada, and causes more morbidity than any other disease. It frequently masquerades as pulmonary tuberculosis, typhoid fever, chronic rheumatism or meningitis, or it may be responsible for inflammatory and suppurating processes in joints and long bones. Inflammation of the synovialis and around joints is so common that it must be regarded as a symptom rather than a complication. The most frequent localisation is in the sacroiliac articulation; next, the hip and shoulder. The effusion in the joint is a pure culture of the melitococcus, and when suppuration follows it seems to act like a fixation abscess, diverting the septicæmia and generating antibodies to such an extent that prompt recovery ensues.

Atropin Test for Paroxysmal Tachycardia (G. Galli, *Reforma Medica*, No. 37, 1918).—Four minutes after a subcutaneous injection of 1 mg. of atropin the pulse dropped from 90 to 73, and the respiration grew slower. Then, the forty-third minute after the injection, suddenly the pulse ran up to 215 and the respiration rate became much increased. The tachycardia lasted for forty-seven minutes and then gradually subsided to 75 by the end of the hour. Even with internal administration of 20 drops of a 1 per thousand solution of atropin it is possible to elicit a typical attack of essential tachycardia in the predisposed, but the interval is over an hour when given by the mouth.

PLAGUE IN INDIA.—During the month of October, 1918, the deaths from plague in India were: Bombay Presidency and Sind, 4,311; Madras Presidency, 342; Calcutta, 1; United Provinces, 65; Punjab, 21; Burma, 227; Bihar and Orissa, 16; Central Provinces, 394; Hyderabad State, 1,137; Mysore State, 1,075; Central India, 645; Rajputana and Ajmer-Merwara, 37. No plague reported elsewhere.

Causal Factors of Cirrhosis of the Liver (Martinez, *Progresos de la Clinica*, vol. vi, No. 68).—Alcohol is unmistakably to be incriminated in about half the cases. In the other cases alcohol is not a factor, but infectious diseases, malaria, syphilis, &c., tobacco, lead poisoning or thyroidism evidently have a share in the morbidity of the liver.

Treatment of Influenza in Burma.—Iawala Singh, Sub-Assistant Surgeon, Naba Railway Dispensary, Upper Burma, has published a pamphlet for general circulation in which he advocates tinct. iodine in the initial stages of influenza, and a stimulant expectorant containing creosote in the second or pulmonary stage of the disease. His prescription in the first stage consists of tincture of iodine fortis M_i , chloroform M_i , aq. 3i , or instead of the strong tincture 54 minims of simple tincture of iodine. The mixture is to be given every three or four hours. A 5-grain dose of quinine is also given every morning.

In the second stage, as well as the iodine mixture, creosote in doses of $2\frac{1}{2}$ minims in a stimulant expectorant is also given, and the 5-grain dose of quinine continued.

The writer advocates tincture of iodine in all cases of fever, be the cause what it may.

Abstract.

DENGUE AT SAINT THOMAS.

By F. F. LANE.

THE *Stegomyia calopus* is practically the only mosquito seen and inhabiting the localities where the disease was most prevalent, and the only place where the mosquito bite seemed to do any damage. The mild character of the bone pains was characteristic. Involvement of the lymph glands, in many cases, was quite severe. No breaking down or suppuration subsequently has been noted. Not one set of glands but all the large superficial glands throughout the body were involved. Epistaxis, although it occurred in only 10 per cent. of the cases, was very severe and difficult to control. Pain on forced motion of the eyeballs was the principal cause of the symptoms described by the patient as "head-ache" or "pain in the eyes." The pain was only elicited on extreme motion. Hyperesthesia, of a most intense variety was noted when the shoulder was unconsciously touched by the examiner. Vasomotor phenomena occurred from the sixth to the eighth day, causing a cyanosis and coldness of the arms, hands, lower legs, and feet in about 17 per cent. of cases. The disappearance of the eruption was followed in about twenty-four hours by a quite severe and long-continued desquamation, accompanied by intense itching at times, a sensation as of swelling of the hands and feet, and a continual and profuse sweating of these parts. Blood examination did not show on the average the very low leukocyte count and the discrepancy in the differential count usually accredited to dengue, yet these findings were sufficiently marked in a number of cases to accord perfectly with other descriptions. These blood

findings depended largely on the severity of the attack.

A very disturbing feature in the convalescence, from the patient's standpoint, was the inability to relish food due to the bad metallic taste that everything had, although the appetite was quite keen. All the ordinary work could be performed without any difficulty, but the least extra strain, such as fast walking or going up hill, brought on an intense weakness and fatigue which had not been present before the fever, and which it took some days and, in many cases, weeks to overcome. In most cases immunity seems to hold after one attack, but about 5 to 8 per cent. of the patients had a recurrence three weeks to several years after the original attack.

The epidemic gradually faded out. With the decrease in rainfall it had almost disappeared. Only an occasional individual who had just arrived would become infected. During the dry season when mosquitoes were very few, dengue was practically absent. The control of the mosquitoes and their breeding places has improved conditions to a slight degree, but the inability to obtain screening for the town, the lack of a properly trained corps of sanitary inspectors, and the difficulty in educating the people, do not give much hope of freedom from dengue in the near future.

Notes and News.

LIVINGSTONE COLLEGE, LONDON.

In October the College will resume its original work of training those who look forward to, or are already engaged on, missionary work abroad, as it has done for the past twenty-two sessions. While used as a military hospital over 2,000 patients have been treated.

NETTLES.—The common stinging nettle is likely to become an important factor in the textile industry as a substitute for cotton. The Germans have formed a "Nettle Cultivation Company."

SPENT wattle-bark and other fibres are being manufactured in the Transvaal into paper of the coarser kinds.

PNEUMONIC PLAGUE IN CHINA.—The *North China Daily News*, says pneumonic plague has again broken out about 100 miles south-west of Taiyuanfu. Some 60 deaths are already reported. The news is by telegram dated January 16. Kikuhshien is some 300 miles from Peking, and was in the plague area when the disease was rife some ten years ago. The modern type of influenza it must, however, be remembered, resembles pneumonic plague closely. Only by the finding of the plague bacillus can the diagnosis be established. The Governor of Shansi has sent Dr. Percy Watson to investigate and institute precautions.

¹ Abstracted from the *United States Naval Medical Bulletin*, October.

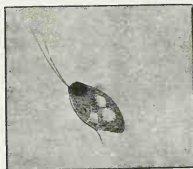


FIG. 1.

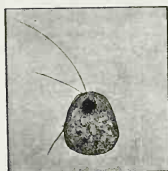


FIG. 2.

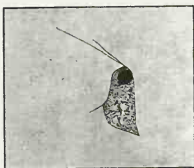


FIG. 3.



FIG. 4.



FIG. 5.

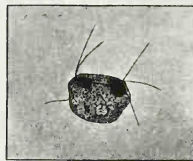


FIG. 6.

× 2,000 diameters.

Original Communications.

DICERCOMONAS SOUDANENSIS.

By ALBERT J. CHALMERS, M.D., F.R.C.S., D.P.H.,

Director, Wellcome Tropical Research Laboratories,

AND

WÄING PEKKOLA,

Wellcome Tropical Research Laboratories,

Khartoum.

CONTENTS. — *Introductory* — *Sudan Flagellate* — *Classification* — *Embadomonadinae* — *Summary* — *References* — *Illustrations*.

Introductory. — We have already published in this Journal and elsewhere several papers dealing with the flagellates found in human faeces in the Sudan, and we now draw attention to a new flagellate which we have found recently in very fluid faeces in a few cases of diarrhoea in Khartoum.

Sudan Flagellate. — In the living condition it is found in human faeces in which it resists death when mounted on a microscopical slide for a longer period than *Chilomastix mesnili* or species of the *Trichomonadinae*.

It is a rounded or oval organism (figs. 1 and 2) measuring about 5.6 microns in its greatest diameter in the living condition, but it varies in size and some individuals are distinctly smaller than this. Its movements are at first fairly rapid, both progressive and rotatory, but when these slow down it is seen that it possesses two anterior flagella and one posterior, and that the last named is attached to the body for a portion of its length (fig. 3), but though this part of its length distinctly vibrates still it does not form an evident undulating membrane. No cytostome or contractile vacuole can be seen in its cytoplasm, which is very granular and at times vacuolated with food vacuoles. It never exhibits any folding or grooving of the body.

When killed by osmic acid, fixed in Schaudinn's fluid and stained by iron-haematoxylin, it preserves its shape fairly well but is apt to be somewhat distorted.

In these preparations it appears in varying forms, some of which are undoubtedly due to artificial contortion (fig. 2) from a more normal rounded or oval shape.

The organism is covered by an elastic simple periplast without markings, which can be raised by the posterior flagellum into a slightly projecting border (figs. 4 and 5) which is certainly not worthy of the name of an undulating membrane.

Inside the periplast lies a granular cytoplasm containing anteriorly a rounded nucleus of the protokaryon type, composed of chromatin granules and without the false or chromatitic membrane of Minchin.

Anterior to this simple nucleus lie two minute granules (fig. 2), the blepharoplasts from which spring the flagella. These blepharoplasts lie so close together that they are only differentiated with difficulty.

The anterior longer flagellum arises from one granule (fig. 2), while the shorter anterior and the

posterior flagella take their origin from the other granule.

The two anteriorly running flagella are unequal, while the posterior flagellum passing backwards lies for a short distance firmly attached to or under the periplast (figs. 3, 4 and 5) and then escapes, forming a free flagellum.

When viewed in certain positions it is observed that this posterior flagellum raises the periplast into a short ridge (figs. 4 and 5), which however is so slight as not to deserve the name of an undulating membrane.

The cytoplasm contains granules and food vacuoles but no trace of a cytostome or contractile vacuole could be distinguished.

The only form of reproduction which we have observed was the end phase of binary fission (fig. 6).

Classification. — It is obvious that this small flagellate belongs to Cohn's subclass *Euflagellata* of Diesing's *Mastigophora* and as it possesses no chromatophores and is not amoeboid that it must be placed in Blochmann's order *Protomonadina*, and as there is no tendency to bilateral symmetry in undividing forms it is classified under Hartmann and Chagas' suborder *Monozoa*.

The presence of the three flagella places it in Saville Kent's family *Tetramitidae* as modified by us.

This family we have divided into subfamilies as follows: —

- A. Without axostyle: —
 - I. With three flagella *Embadomonadinae*.
 - II. With four flagella *Tetramitidinae*.
- B. With axostyle *Trichomonadinae*.

From these characters it will be clear that the organism in question belongs to the *Embadomonadinae* in which come the genera *Enteromonas*, *Dallengeria*, *Trimastix*, and *Embadomonas*.

It does not belong to the genus *Embadomonas* because there is no cytostome, nor to *Enteromonas* because there are not three anterior flagella and because it possesses a posterior flagellum which *Enteromonas* does not and because of the difference in the structure of the nucleus. It differs from *Dallengeria* in not possessing two posterior flagella and because its posterior flagellum is attached to or passes under the periplast for a short distance.

It is separated from Saville Kent's *Trimastix* because: —

- (1) It has one and not two posteriorly directed flagella.
- (2) It is not rolled upon itself.
- (3) The posteriorly directed flagellum does not lie in a groove.
- (4) There is no contractile vacuole.

We may therefore assume that it is unknown and give it the name *Dicercomonas* as Wenyon and O'Connor have given the name *Tricercomonas* to an allied flagellate belonging to the *Tetramitidinae*.

The genus *Dicercomonas* may be defined as follows: —

Embadomonadinae without cytostome or contractile vacuole but with a simple type of nucleus and two anterior and one posterior flagella of which the last is attached to the body for a portion of its length, after which it ends freely.

The type and only known species is *Dicercomonas soudanensis* found in the faeces of Europeans and Natives in the Anglo-Egyptian Sudan.

Embadomonadinae—The genera of the subfamily *Embadomonadinae* will therefore include:—

- (1) *Dallengeria* Saville Kent 1880.
- (2) *Trimastix* Saville Kent 1880.
- (3) *Embadomonas* Mackinnon 1911.
- (4) *Enteromonas* da Fonseca 1915.
- (5) *Dicercomonas* Chalmers and Pekkola 1919.

These genera may be separated (fig. 7) from one another as follows:—

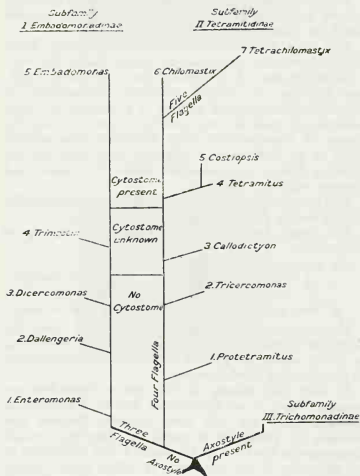


FIG. 7.

A. Cytostome absent.

- (i) No posterior flagella:—
Three anterior flagella *Enteromonas*.

- (ii) Posterior flagella present:—
a One posterior and two anterior flagella *Dicercomonas*.
b Two posterior and one anterior flagellum *Dallengeria*.

B. Cytostome unknown, but there is a depression or groove which may perhaps indicate this organella.

With one anterior and two posterior flagella, of which one lies attached to the body in the groove and then escapes freely while the other is free and trailing throughout its length .. *Trimastix*.

C. Cytostome present.

With one anterior and one posterior, cytostomic, flagellum and with the margins of the large cytostome, siderophilous and often folded *Embadomonas*.

Our views as to the relationship of these genera may be gathered from the diagram represented as fig. 7 in this paper.

Summary.—In the present communication we have described a new flagellate, *Dicercomonas soudanensis*, belonging to the family Tetramitidae and the subfamily *Embadomonadinae* which we have found in faeces of cases of diarrhoea in the Anglo-Egyptian Sudan but which we do not believe to be pathogenic.

Khartoum,

January 5, 1919.

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ILLUSTRATIONS.

Figs. 1-5. Drawings to show the structure and appearance of *Dicercomonas soudanensis*. × 2,000 diameters.

Fig. 6. Drawing to show binary fission of *Dicercomonas soudanensis*. × 2,000 diameters.

Fig. 7. Diagram of the possible affinities of *Dicercomonas*.

Observations on Scurvy (V. Stefansson, *Journ. Amer. Med. Assoc.*, November 23, 1918).—The strongest antiscorbutic qualities reside in certain fresh foods and diminish or disappear with storage by any of the common methods of preservation—canning, pickling, drying, &c. Fresh tomatoes may be valuable (I have never tried them), but canned tomatoes are of little or no value; fresh potatoes are good, but desiccated potatoes have shown little or no adequacy in our expedition when tried in my absence by believers in that form of diet; the juice just expressed from the fresh lime is said to be excellent, but bottled lime juice has never yet prevented scurvy. Cooking lessens or destroys the antiscorbutic value of most or all foods. Three average raw potatoes are commonly said by miners definitely to turn the tide of scurvy that has not reached an extreme stage; in our own expedition, boiled and roasted fresh bear meat did not relieve scurvy except with such slowness that it is debatable just what its effect was, if any. Our party and persons known to me have had the same experience with venison. I am of the opinion that most men, if left to their own inclinations and supplied with abundant cooked fresh meat will avoid scurvy: cooked meat acts but slowly on an advanced case—the efficiency of it depending probably on the "rareness" of the cooked meat. Meat and fish slightly or well advanced in the process of ordinary putrefaction seems to be as good an antiscorbutic as fresh flesh, or nearly so—witness the well-known fact that Eskimo tribes often live for several months in succession on putrid meat or fish without ever developing scurvy, while Eskimos working for white men or living on purchased provisions have it quite as readily as Europeans living on the same sort of diet.

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THE JOURNAL OF

Tropical Medicine and Hygiene

FEBRUARY 15, 1919.

THE LONDON SCHOOL OF TROPICAL MEDICINE.

THERE is a rumour abroad that the London School of Tropical Medicine is to be moved to the centre of London. There is also a whisper that even the site of the school has been selected somewhere in the

West Central division of the town. There is much to be said concerning the advantages of such a move, and all arguments end by favouring the idea. The school opened in October, 1899. That is twenty years ago, so that the school will "come of age" next year. The initiation and growth of the school since it was opened has proved a phenomenal success, and although temporarily suspended in its career during the war, it again opened its portals in January, 1919, and the teaching is proceeding apace. It would be a fitting stamp to its majority were the school to make its presence felt in the centre of the metropolis. The first public discussion of the necessity of such a school was held on March 2nd, 1898, by Sir James Cantlie at a meeting called by him at the Imperial Institute, South Kensington, and at which he read a paper on the Colonial Medical Service. Sir Joseph Fayrer, Bart., presided. There were present at the meeting Sir Patrick Manson, G.C.M.G., the late Dr. Thin, Professor Simpson, C.B., Dr. Hillier from South Africa, afterwards M.P. for Herts, and a number of those interested in tropical medicine. The address by the originator of the movement advocated the formation of a school of tropical medicine on the lines along which it is now conducted, and a unanimous vote of appreciation of such a movement was passed.

The debate as to the site of such a school was keenly maintained, and by none more so than by Sir Joseph Fayrer, who insisted that the proper and only site was at Netley, where the Military School of the Army Medical Department was then located. Sir Patrick Manson upheld London as being the most suitable place for the school, whilst Dr. Thin considered that it was impossible to find clinical material in London, or anywhere in the British Isles, to meet the occasion, and advocated Rome, Egypt or India as the only possible place to meet the requirements for a school in which to teach tropical ailments. Dr. Hillier in his speech opposed the scheme to begin with, and ended by upholding it in its entirety. The opinions of the speakers were so strongly held that it was impossible to decide upon the site, and at subsequent meetings it was arranged to forward the resolutions to Mr. Joseph Chamberlain, then Secretary of State for the Colonies, without reference to the site of the school, on which no agreement could be come to. The refutation of Sir Joseph Fayrer's advocacy was complete when the "Netley School" itself was moved from Netley to London, and is now established as the Royal Army Medical College, in Chelsea, London.

Mr. Chamberlain luckily had as his medical adviser Sir Patrick Manson, who had been prompting Mr. Chamberlain for some time as to the necessity for such a school. The offer of a deputation to wait upon Mr. Chamberlain was declined, as he considered the copy of the resolution, forwarded to him by the meeting already referred to was sufficient to show the opinion of the public in the matter, and to justify him in bringing the matter before the Government. This was all he wanted to carry the scheme already contemplated by him at the suggestion of Sir Patrick Manson to fruition.

Why the present site of the school was chosen is explainable in several ways. At the time the formation of a school of tropical medicine was being advocated, Sir Patrick Manson was one of the physicians on the staff of the Seamen's Hospital at Greenwich. The number of cases of tropical diseases which came under his notice at that hospital suggested the possibility of utilizing it for the instruction of medical men about to proceed to the Tropics. He had divulged his ideas to the authorities of the hospital, who, with that keen receptivity and wisdom which has characterized their actions in every matter appertaining to the school from its initiation to the present moment, lent the matter a sympathetic ear, and were ready to act when Mr. Chamberlain approached them formally upon the subject. The reason that the school was established at the Royal Victoria and Albert Docks Branch of the Seamen's Hospital, and not at Greenwich itself, was that it was near to the shipping, from which cases of tropical diseases were mostly obtainable. Moreover it is well known that natives of the tropics, when taken to hospital, object to be taken far away from their ships in case (in their ignorance, no doubt) they should miss their sailing and would be carried away from the friends and shipmates hailing from their own homes in India, Africa or elsewhere, and thus be altogether stranded in a land foreign and unknown to them. The argument was justified, for the supply of clinical material is the very essence of a school of tropical medicine, and whatever happens as to the removal of the school it would appear that to begin with, at any rate, the docks was the most appropriate site from almost every point of view.

Now, however, that the reputation of the school and hospital is known far and wide, the condition of affairs is changed. The removal of the school will in no way affect the Seamen's Hospital. It supplies a great and permanent need in the locality in which it is established. All cases now brought to the hospital from abroad will continue to be brought there as of yore, whether medical or surgical; and only such cases as are useful for teaching purposes and require special treatment need be brought to the school in London, where a "clinic" will be formed. The advantage to patients, to students, and to teachers will be appreciated. The teachers in the school have at present to travel a long distance going to and fro to meet their classes, and the physicians and surgeons to the hospital find it most undesirable to be so far removed from their patients, as they cannot visit them so frequently as they would like to, in the patients' and their own interests.

For the students there are similar disadvantages in having the school at the docks. A good many find comfortable quarters in the residence established at the school, but the environment does not offer attractions, nor does it afford opportunities for exercise. For those who reside away from the school, either for want of accommodation there or for family reasons, the long time spent in going and coming is regrettable and inconvenient from every point of view, for the work at the school is a concentrated effort, and every hour spent in travel is so much time lost

or necessary study. Yet another poignant reason for moving the school to Central London is that it will afford opportunity to the medical profession generally of gaining a knowledge of tropical ailments—a most important, if not perhaps the most important, argument in favour of the move. Medical men in private practice are continually coming across cases of tropical disease; this is not only the case in war time, but in normal time as well. This widespread Empire has its being largely in tropical countries, and men, women, and children are constantly going to and fro from the homeland shores. It is a necessary part of the home-dwelling practitioner's work to treat these patients, whether in London or the provinces, and, that being so, it is expedient that a convenient place of study should be afforded them. This would be attainable were the school in Central London; having as it were a school at their door, where they could visit the school and its clinic without the loss of time at present involved in travel.

Whatever happens, it is to be hoped and insisted upon that the school remains under the auspices and control of the Seamen's Hospital Society. They and they alone can supply the patients necessary for teaching and investigation. They have shown their public spirit, and were the first to recognize the importance of tropical ailments for our Imperial needs. They have guided, maintained and encouraged the study to the great benefit of the Empire and mankind in general, and to disturb their wise control would be a calamity which no one, it is hoped, will ever think of advocating or attempting.

Abstract.

PUBLIC HEALTH IN EGYPT.

THE Commission appointed by the Egyptian High Commissioner, consisting of: President, Lieutenant-Colonel Andrew Balfour, R.A.M.C., Director-in-Chief, Wellcome Bureau of Scientific Research; members, Lieutenant-Colonel G. E. F. Stammers, R.A.M.C.; Mr. E. S. Crispin, Director of the Medical Department of the Sudan Government, and Dr. Charles Todd, Director of Laboratories in the Egyptian Public Health Department, have the satisfaction of knowing that their recommendations are being carried out.

The terms of reference of the Commission were: (1) To consider the organization and duties of the Public Health Department and its relations with other departments concerned in public health; (2) to make in general terms suggestions for increasing the efficiency of the Department; (3) to indicate the nature and number of the official appointments to the Department which seem to be required, without nominating persons to fill them. The Commission was empowered to call the necessary evidence and have access to documents in framing a report to be sent to the Prime Minister or President of the Sultan's Council.

The report of the Commission states that the

Department suffers from having no proper official status; being not an entity but a branch of the Ministry of the Interior, it has no direct official access to the High Commissioner, while the channels—namely, the Adviser or the Under-Secretary of State for the Interior—are without the necessary technical training to understand the needs of the Public Health Department. Upon the outbreak of war the efficiency of the Public Health Department, already hampered by the multifarious nature of its duties, was gravely affected by the fact that its officials were allowed to be seconded for duty with the troops at the very moment when the personnel of the Department should have been strengthened instead of weakened, although effective organization managed to avert any disaster. With general reference to the present-day conditions in Egypt so far as they have a bearing on public health, the report is sanguine. Developments in roads, railways, and canals will occur, having regard to the successful issue of the war, while education in modifying the outlook of the Egyptian peasant and rendering the future of sanitation more hopeful is expected to have a powerful effect. "It is obvious," says the Report, "that the signs are propitious, and though, owing to the war, the time may not yet be actually ripe for extensive modifications in health organization, yet it is clear that the present period of change and advance offers special facilities for the consideration of a scheme of reform." But immediately afterwards the Report speaks in almost unmeasured language of the plague of filth in Egypt, and the first section concludes by unanimous agreement that a Ministry of Health is essential for securing proper sanitary reform in the Protectorate.

A scheme for a central health organization is then outlined. It commences with the statement that the Ministry of Health must be a separate bureau, with an Under-Secretary of State at its head as President. Immediately below him it is suggested there should be a Director-General of Health, who is intended to be the main driving force in the Ministry, as his duties will require him to co-ordinate the work of important subordinates as well as to prepare the annual Budget. The President will also have the advantages of a Technical Adviser, who, under the alternative title of Director of Medical Intelligence, will conduct a bureau of information, control the laboratories and research work, keep in touch with scientific developments in other countries, and be responsible for an educational museum. The Central Board of Health, it is suggested, will be completed by seven officers appointed as directors respectively of Sanitary, Epidemic, and Medical Services, of Lunacy, Medical Education, Public Health Laboratories, and Sanitary Engineering. The first three of these Directors being designated as *ex-officio* members of the Board, it would seem that it is intended to co-opt the others as occasion requires. A Secretary-General is added not only to manage the records and deal with all questions relating to subordinate personnel, but also to sift the work of the Director-General, who might otherwise become overburdened with detail. The Report goes very carefully

into the separate and combined duties of these various important central officials, indicating that technical inspection will undoubtedly be needed in many directions, as for provincial and ophthalmic hospitals and pharmacies, schools, and food and water control. The establishment of a chair of Hygiene in the Kasr-el-Aini School of Medicine and of a Diploma in Public Health is strongly advocated. Not the least important is the Director of Medical Education; as Egyptian medical students have free education, but there is only one school—at Cairo—for the whole of Egypt, admission depends on the leaving examination of the high schools. Accommodation is limited, to the disadvantage of the teachers, as the wealthier students, when they cannot be trained in Egypt, come to the United Kingdom, and are precluded from entering Government service, as appointments are made on the results of the student's final examination. Not only is it a question of the evil of examination, but students from a distance, as from Palestine, Mesopotamia, and other parts, are unable to be students, and form a firm, friendly bond between Egypt and adjacent countries. Either there should be more schools affiliated to Cairo, or the one school should be much enlarged. It is desirable to do both, to obviate the difficulty of being a long way from home for years, yet to allow more to study for a time at Cairo, the only school that has a department for tropical diseases of children.

PROVINCIAL ADMINISTRATION.

The Report becomes very detailed in character when dealing with provincial organization for the public health of Egypt, for here, rather than in central administration, are the chief defaults to be found, and here reform will get its quickest returns. The first weakness noted in provincial administration is the paucity of British Provincial Inspectors. These officers are few in number, do not live permanently in their districts, and are kept so constantly moving about by the multifarious nature of their duties that they rarely get into close touch with any section of the population. "A good type of man," says the Report, "has undoubtedly been an officer of the Royal Army Medical Corps, possibly in part because he has received a special training in hygiene and understands discipline. This source of supply should be readily available in the future." Reference here must clearly be made to medical men who have received temporary commissions in the Royal Army Medical Corps during the past four years, because there could not possibly have been any successful demand made previous to the war upon the Royal Army Medical Corps, whose cadre was then lamentably short. The Report continues: "The posts should be filled by men of about 25 years of age, and they should preferably have held some hospital appointment before joining the service of the Ministry. It would be a distinct advantage if they possessed diplomas in public health or in tropical medicine and hygiene." Such men will not be found in any quantity relinquishing at the age of 25 the Royal Army Medical Corps, but it seems possible, if

the Egyptian bureau of health comes into rapid being, that British Provincial Inspectors might be obtained from among those who have held temporary commissions. The sort of work indicated should be quite attractive to many after their military experiences, but if Egypt is to get any large supply the conditions of service must be inviting.

The Report indicates that these Divisional Inspectors, as they are officially called, should be first placed under a senior officer so as to become familiar with Egyptian manners and to acquire Arabic, while arrangements, it is proposed, should be made whereby they can visit Cairo in rota and get an insight into the higher machinery of the service. The general duties of a Divisional Inspector may be described as those of a medical officer of health of the *Mudiria* (province or county). The report recommends not only that there should be many more Divisional Inspectors, but that they should be better paid, and that there should be a chance for Health Inspectors in the *Mudiria* (who are Egyptian doctors and next in rank to Divisional Inspectors) being raised to the position. Below the *Mudiria* Health Inspectors comes the *Markaz* doctor, on whom at the present moment, and for very low pay, there fall the private practices in the *Markaz* as well as much public health work, care of schools and prisons, registration duties, and medico-legal work. A *Markaz*, it may be said, is a district of a province, and may contain many large villages. Some of the *Markazes* have, we understand, as many as 80,000 inhabitants. The Commission responsible for the Report have perhaps devoted more time and thought to the remedy of the *Markaz* conditions than to any other part of their work. They obtained valuable evidence, and arrived at the conclusion that the best course to pursue eventually would be to divide the *Markaz* doctors into two categories according to their work, (a) Sanitary and (b) Medical. The (a) *Markaz* doctor would under the scheme be in sanitary charge of public works, excluded from private practice, and be responsible for general sanitation, notification and public treatment of communicable disease, vaccination, quarantine, and care of pilgrims. The (b) *Markaz* doctor would be in charge of the medical side of some of this work—namely, the treatment of communicable disease, the medical work done in prisons and schools, the examination of prostitutes, and all medico-legal work. He would be, of course, allowed private practice, which would, as stated, be denied to the (a) *Markaz* doctor, to whom, however, promotion to the *Mudiria* Health Inspectorships would be open. The Commissioners recognize that at the present time this scheme is not feasible, but suggest that it be given a trial in certain suitable areas. To meet immediate needs they propose a large increase in the number of *Markaz* doctors, whose duties would thus be lightened in some measure. A notable recommendation in the Report is the introduction of qualified British sanitary inspectors—i.e., men of the N.C.O. class—both in the case of the provinces and the large towns. In the former they would be attached directly to the British Divisional Inspectors and would

supervise the work of the Egyptian inspectors of nuisances, who at present do not exist in the provinces, and whose creation is strongly urged.

Provision is made in the Report for the institution of training centres in the large towns, where the methods and appliances of sanitation can be taught to these inspectors of nuisances. An eloquent plea is here founded on Lord Kitchener's latest work for village sanitation service. The authors of the Report protest against allowing the fellahen to live under existing sanitary conditions. Proper village water-supplies, incinerators, latrines, and conservancy systems are required to make Egyptian village life less of a sanitary scandal.

CONCLUDING REMARKS.

The various departments of medical service receive detailed notice—the department of epidemic service, of hospital management and inspection, of police, prison, and railway medical service, of school inspection and other sub-divisions of medical work are all carefully noticed in the Report, as well as such subjects as medical schools and research laboratories, public health laboratories, and vaccination institutions. A special section of the Report is devoted to the public health of Alexandria, Cairo, and other large towns. The Report is an outspoken document, covering a large amount of ground and giving information in a readable and intelligible form, which is valuable to all sanitarians as well as to those whose interests lie specially in Egypt. It can easily be understood that the unification of health activities in such a country as Egypt constitutes a grave problem, but it is exactly the sort of problem which the British mind is best fitted to tackle. If those in authority are prompt in translating the recommendations of this Report into the legislation of the Protectorate their reward, in the future saving of trouble, will be very great. What Egypt has done England should do.

Report.

HONG-KONG.

REPORT ON THE INVESTIGATIONS OF THE OUTBREAK OF EPIDEMIC MENINGITIS IN HONG-KONG BY FIRST LIEUTENANT PETER K. OLITSKY, M.R.C., U.S.A., OF THE ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH, NEW YORK.

Laid before the Legislative Council by Command of His Excellency the Officer administering the Government,
October 17, 1918.

THE PRODUCTION OF ANTIMENINGOCOCCIC SERUM IN THE COLONY.

The conclusion to produce serum was arrived at as a result of (a) determination of the type prevailing among the patients in the Colony; (b) the examination of the various sera for treatment in use during

the epidemic; (c) the possibility of epidemics recurring in the future, and (d) the inability of the Colony to procure reliable serum promptly.

(a) *The Prevailing Type of Meningococcus*.—Up to the present time there were isolated from the spinal fluids of 59 patients as many pure cultures of meningococci. These 59 cultures were tested for type with the following results: normal type (regular or orthomeningococci), 0; para type (parameningococci of Docter), 56; irregular para type, 3.

The para type corresponds to Type I of Gordon's (English) classification; the normal to Type II; the irregular para type possibly to Type III. The para type agglutinations ranged from 1:50 to 1:800, the irregular para types showed these reactions:—

Culture No.	Normal type (immune serum)	Para type (immune serum)	Polyvalent (Flexner serum)
1	1:50	1:400	1:800
2	1:100	1:400	1:400
3	1:50	1:200	1:200

From these tests it is obvious that about 95 per cent. of these patients have been infected with the same type of the meningococcus.

It has been definitely established that immune serum made with one type fails to afford protection to the other types of meningococci. Hence it is advisable to prepare a serum containing a high antibody content against this type, the parameningococcus. However, should the type in the future change, and to cover the exceptional case infected with another type, the Government bacteriologist has been instructed to include in his antigen the other types (although in smaller amounts), thereby making the serum polyvalent to a degree. He has also been instructed in the preparation of rabbit immune serum for type determination, so that in the event it becomes desirable to change the antibody content of the serum to meet with the local conditions it will be easily accomplished.

(b) *The Examination of various Antimeningococci Sera for Antibody Content*.—A survey of status of the treatment of patients revealed that there were four sera from different sources in use. One serum was prepared by a commercial firm and three were prepared by Government laboratories.

Ten cultures of meningococci isolated from patients in the Colony were submitted to agglutination tests with these sera.

The results are tabulated (with Flexner's serum used as a control) as follows:—

Serum	Number of cultures agglutinated	Number not agglutinated
Commercial laboratory	3	7
Government laboratory A	5	5
" " B	3	7
" " C	2	8
Flexner's serum (control)	8	2

The Flexner serum agglutinated the eight cultures in dilutions of at least 1:800, while the other sera agglutinated the cultures usually in dilutions of 1:50 with the limit in a few instances of 1:400.

Hence, with the possible exception of the serum from Government Laboratory A, the antimenin-

gococci sera available in the Colony is low in antibody content. Furthermore, as it has been determined that the agglutinin content runs parallel with the therapeutic efficacy of a serum, it may be stated that the Colony has had supply of inefficient serum.

(c) *The Possibility of Epidemics Recurring*.—When a potent serum will have been made, will there be need for it? The occurrence of sporadic cases of epidemic meningitis throughout the summer is quite possible. Although the weather is warm at present (a time when meningitis tends to disappear naturally) from three to five cases are still being reported daily (mid-June). This would lead one to believe that under the adverse conditions of the cold season another epidemic may occur. Indeed, the amelioration of the recent epidemic is due to the fact that the susceptible element has been to a great extent affected, leaving a considerable number of insusceptible persons; but active migration of the population usually occurs into the Colony, thus bringing a new susceptible element in contact with the great number of carriers. Carriers in great number are undoubtedly developed as a result of an extensive epidemic, and, under adverse conditions, as overcrowding, the advent of new elements of the population may result in another outbreak.

(d) *The great distance of the Colony from the sources of supply of reliable serum adds another factor in favour of its production locally.*

On these bases, a report was submitted to the Government advising the preparation of antimeningococci serum in the Colony.

In testing the Flexner serum with all the cultures of meningococci which are on hand at the Bacteriological Institute it was found that of 59 cultures the serum agglutinated 54. The Government having subsequently agreed to produce serum locally, four horses were started in an attempt to have them yield serum approaching as nearly as possible this standard.

It is believed that the yield from these horses will be adequate to the needs of the Colony.

TREATMENT OF THE PATIENT.

The marked success of specific treatment of epidemic meningitis needs no commentary. The results of over 1,300 cases treated with serum supplied by the Rockefeller Institute have been summarized by Flexner, *Jour. Exper. Med.*, 1913, vol. xvii, page 553 in these words: "It is our belief that the analyses of histories of cases of epidemic meningitis which have been presented furnish convincing proof that the antimeningococci serum, when used by the subdural method of injection, in suitable doses and at proper intervals, is capable of reducing the period of illness: of preventing, in large measure, of chronic lesions and types of the infection; of bringing about complete restoration to health in all but a very small number of the recovered, thus lessening the serious, deforming and permanent consequences of meningitis, and of greatly diminishing the fatalities due to the disease."

Notwithstanding these facts it appears that only very few of the great numbers of Chinese received serum treatment. The records of the Tung Wah Hospital (presented by Dr. Thomas, House Physician) show these results (from February 2 to May 20, 1918: Total number of patients treated, 417; number of patients receiving Western treatment, 85; number of patients receiving Chinese treatment, 332.

Of the 85 patients receiving Western treatment, 14 patients were treated by lumbar puncture only; in this series the mortality was 57.1 per cent.; 71 received 1 to 5 lumbar punctures and were injected incompletely and with sera of low antibody content; in this series the mortality was 45 per cent.

Of the 332 patients receiving Chinese treatment, 228 received at least one lumbar puncture. The mortality in this series was 51.1 per cent.

The remainder, 104 patients, received no serum nor lumbar punctures. The mortality in this series was 84.6 per cent.

The treatment advised is: (1) The use of a potent serum. (2) The injection of the serum early in the disease. (3) The injection of sufficient amount in a systematic manner. (4) The intravenous injection combined with intraspinal.

Depending on the severity of the case and the amount of spinal fluid withdrawn, 30 to 60 c.c. should be injected intraspinally. While the temperature remains high and the meningococcus is still present in the cerebrospinal fluid, the injections may be repeated every twelve hours. The next interval between injections should be twenty-four hours, then forty-eight hours as improvement ensues. In severe cases, however, the injections are persisted in at more frequent intervals. In one of two cases at Hong-Kong, a Portuguese patient, in whom the treatment could be properly followed, improvement followed the use of 600 c.c. of the Flexner serum. This patient suffered from a very severe form of the disease, and the prognosis was very unfavourable at the start.

In severe cases it is also advised to give 50 to 100 c.c. of serum intravenously. The intravenous injections should supplement the intraspinal. In four of ten moribund cases in the Tung Wah Hospital upon whom blood cultures were made, the meningococcus was found circulating in the blood. The same type of meningococcus (the parameningococcus in all four patients) was found in the blood as in the spinal fluid. The positive blood cultures serve to emphasize the necessity of injecting the antimeningococcal serum intravenously as well as intraspinally. The method is especially indicated where signs of a generalized meningococcal septicaemia is in evidence, as shown by skin hemorrhages or joint affections and in fulminating cases.

THE DIAGNOSIS OF THE DISEASE.

A survey of the course of the epidemic makes it certain that numerous cases of epidemic meningitis have occurred, but have escaped detection.

The first reports showing diagnoses of epidemic

meningitis were returned to the Medical Officer of Health, Dr. Gale, on February 9. On February 11 there were reported eight verified cases. Since then cases were definitely diagnosed as epidemic meningitis. As this disease in epidemic form has a definite course, and as a great number of cases of hemorrhagic small-pox were reported previously to February 9, 1918, although no distinct epidemic of small-pox was evident at the time, it is logical to assume that some of these cases were that of epidemic meningitis. Indeed, on February 5 and 6 four cases of hemorrhagic small-pox were reported. January 28 to February 5 eight cases were reported. With the greater number of subsequent reports of epidemic meningitis, hemorrhagic small-pox ceased to be a factor in the daily returns. The same assumption may apply to the several cases of a typical enteric fever reported during January.

To this class of "missed" cases may be added another, still more important from the point of view of prevention, the mild and ambulatory cases. For these are the great sources of spreading the infection.

Lumbar puncture is an absolute essential in the treatment and in the recognition of cases of epidemic meningitis.

It is desirable to swab the naso-pharynx as well when the symptoms are suspicious and the spinal fluid removed is clear, for practically almost every case of epidemic meningitis harbours the organism in the post-nasal mucus.

THE COURSE OF THE EPIDEMIC AND THE FACTORS CONTRIBUTING TO ITS DISSEMINATION.

In the following an attempt will be made to state the findings which resulted from an investigation on the course of the epidemic in the colony, and the factors which contributed to its dissemination and continuance. In the next section these facts will be correlated to bring out the epidemiological conclusions.

(a) *The Course of the Epidemic.*—Epidemic meningitis is not a new disease in Hong-Kong. There is evidence to believe that sporadic cases have occurred from time to time in the colony. In the Philippines, of which Manila is the next port of call of the trans-Pacific steamships, seventy cases were detected three years ago.

In two of these cases the meningococcus was isolated in pure culture from the cerebrospinal fluid; and is still preserved at the Bureau of Science, Manila. As epidemic meningitis was not a notifiable disease until the present epidemic, there are no recorded cases. However, Dr. Johnson, the Principal Civil Medical Officer, has seen a case five years ago in the colony. Again, one may assume that sporadic cases may have occurred in Hong-Kong, especially in view of the fact that it is one of the largest commercial ports in the world and thousands of passengers from everywhere pass through annually. No epidemics, however, were known until this outbreak.

(To be continued.)

Original Communications.

SOME NOTES ON THE TREATMENT OF LEPROSY.

By A. CONNALL, M.D.

FOUR methods of treatment have been given an extended trial at the Yaba Leper Asylum, Lagos, Nigeria:—

(1) Chaulmoogra oil. This has been in constant use.

(2) *Nastin*. Dr. Beale-Browne and Dr. Macpherson applied this preparation over a period of four years.

(3) Heiser's combination of chaulmoogra oil, with camphorated oil and resorcin, was given to certain cases from May, 1916, until June, 1917.

Dr. Coghill published a description of these (*Annals of Tropical Medicine and Parasitology*, vol. xi, No. 2, August, 1917). (See also Annual Report, Medical Research Institute, 1916.)

(4) Gynocardate of soda. The latter half of the year 1917 was devoted to a trial of this drug.

It is difficult to reach a true estimate of the value of any one drug in the treatment of leprosy. A perusal of the Asylum Case Books leaves the impression that none of the four named methods of treatment is specific. Relapses have occurred in treated and untreated cases. Definite improvement has been noted in the entire absence of drug administration. The negro leper is prone to alternating optimism and pessimism. He eagerly welcomes a new therapeutic measure and tends to exaggerate any beneficial results, but despondency sets in sooner or later, when he may refuse further dosage.

A short history of twenty patients will suffice to demonstrate the results, beneficial or otherwise, of the various forms of treatment.

Case.—A. D., male, aged 28 years. Admitted May, 1910. Duration of disease, five years. On admission, numerous maculae, mutilation of digits, anaesthesia both feet.

Nastin administered at weekly intervals from December, 1910, until August, 1911, caused lessening in size and number of maculae.

Chaulmoogra oil, twice daily, was prescribed in August, 1913, when the anaesthetic macular areas had again increased in size and number.

A *native ointment* (which consisted of cashew nut, ground to powder and mixed with carbolic acid and shea butter) applied to the maculae in October, 1913, caused deep ulceration. When healing was completed there was returned sensation to the areas. At this time there was anaesthesia of the right arm, from the elbow downwards, and of both legs from the knee downwards.

Until April, 1914, when the patient decamped, there was no further development of the disease under the administration of *chaulmoogra oil*.

Case.—A. L., male, aged 30 years. Admitted January, 1911. Duration of disease, one year. On admission, maculae on face, chest, arms, and legs.

Nastin administered from January, 1911, until December, 1913.

In August, 1913, the maculae were disappearing. In November, 1913, the only remaining maculae were two or three on the face and neck.

He was discharged on May 28, 1914; no maculae, no anaesthesia, and no *B. leproe* in the posterior nares (compare with Case B. W. later).

Case (No. 5 in Report, 1916).—A. K., male, aged 45 years. Admitted May, 1909. Duration of disease, "since a boy." On admission, "main en griffe," and anaesthesia left hand; left foot, all toes, absorbed, anaesthesia; right foot, extensive ulceration on sole.

Nastin was administered from September, 1909, until December, 1913.

In December, 1910, he could move the fingers of the left hand. Sensation had returned to the left foot. In August, 1913, there were maculae on the trunk, arms, and neck. There was a small ulcer on the left sole, and the ulcer on the right sole had healed. In December, 1913, the maculae had disappeared. In January, 1914, there were three small ulcers on the left sole.

Chaulmoogra oil was prescribed at this time.

In July, 1914, there were no ulcers. In May, 1916, there was anaesthesia in the left arm and both legs. There was a large ulcer on the left sole. The left ulnar and both peroneal nerves were thickened.

Heiser's treatment was begun at this time.

At the end of December, 1916, only the left foot was anaesthetic, and the ulcer had healed.

Gynocardate of soda was substituted in June, 1917, in $\frac{1}{10}$ gr. doses, given intravenously, once a week, and increasing by $\frac{1}{10}$ gr. up to 3 gr.

At the end of December, 1917, there was anaesthesia from both elbows downwards, and from both knees downwards. There were no nerve thickenings. There was an ulcer at the back of the right elbow. No *B. leproe* found in a smear from the nose.

Case.—B. K., male, aged 43 years. Admitted August, 1901. Duration of disease, eighteen years. On admission, ulceration and deformity of toes of both feet.

Chaulmoogra oil was given from 1901 until 1909, during which time ulcers appeared, healed, and reappeared on both hands and feet.

Nastin was administered from September, 1909, until December, 1910, and again from July until November, 1911.

In August, 1913, *chaulmoogra oil* replaced the *Nastin* treatment. At this time there were maculae on the trunk and an ulcer on the right foot. In November, 1913, the maculae had faded and the ulcer had healed. Treatment was suspended in January, 1914. In March, 1914, an ulcer developed on the right sole. This was healed in June, 1914. In July, 1914, the old ulcer on the right sole reappeared, and there was impairment of sensation in both legs.

Heiser's treatment was started in September, 1916.

At this time there was anaesthesia in both arms and legs. There was a large ulcer on the right sole. Both ulcer and both peroneal nerves were thickened.

At the end of December, 1916, there was some return of sensation to the right arm and both legs. The ulcer was healing.

Gynocardate of soda was begun in June, 1917.

At the end of December, 1917, sensation was complete in both legs, but both hands were anaesthetic. The ulcer was not quite healed. There were no nerve thickenings and no maculae. No *B. lepræ* were found in a smear from the posterior nares.

Case.—B. O., female, aged 36 years. Admitted February, 1912. Duration of disease, "some years." On admission, mutilation of all digits, "main en griffe" both hands, ulcers on right big toe, maculae on trunk and arms.

Nastin was given from February, 1912, until July, 1913.

In September, 1913, there were ulcers on both feet. The maculae were less prominent.

Chaulmoogra oil was then substituted. From then until September, 1916, ulcers appeared, healed, and appeared again, and sensation became impaired in the hands.

Heiser's treatment was given from September, 1916, until June, 1917, when *gynocardate of soda* was administered.

At the end of 1917 sensation was complete, there were no ulcers, and no maculae. No *B. lepræ* were found in a smear from the posterior nares.

Case (No. 1 in Report, 1916).—D. A., male, aged 38 years. Admitted February, 1912. Duration of disease, five years. On admission, leonine expression, nodules, and thickening of skin.

Nastin was administered from February, 1912, until May, 1913.

On August 31, 1913, there were more numerous nodules on face, ears, and nose.

Chaulmoogra oil was substituted on October 21, 1913.

In January, 1914, there were ulcers on the right middle and index fingers. These were healed on February 5, 1914. On June 1, 1914, anaesthesia of right foot and ankle was noted.

Heiser's treatment was begun on May 19, 1916. On this day the condition was as follows:—

Face leonine. Skin thickened and of a yellowish colour. Many nodules on face, nose, ears, and lips. Anaesthesia left forearm and thumb, right forearm, middle and ring fingers, and both legs from below the knee. Both ulnar nerves thickened. Maculae on hands and legs. Both feet and ankles cedematous.

At the end of 1916 the nodules had diminished in size and the skin was less thickened. Some of the maculae had disappeared, and there was some return of sensation.

Gynocardate of soda was substituted in May, 1917.

At the end of 1917 sensation was complete except

in the legs. There were no maculae and no ulcers. There was slight oedema of the left foot. The nodules were hardly perceptible, and the skin generally was soft, glistening, and finely wrinkled. There was no thickening of the ulnar nerves. No *B. lepræ* were found in a smear from the posterior nares.

Case (No. 2 in Report, 1916).—L. A., male, aged 21 years. Admitted November, 1911. Duration of disease, four months. On admission, nodules on face and forehead, maculae on trunk.

Nastin was administered from November, 1911, until December, 1913.

On September 1, 1913, the nodules had almost entirely disappeared, and only a few maculae remained. On November 27, 1913, there was some anaesthesia of both ankles and feet. On May 19, 1916, the leonine expression was present. There were nodules on ears, cheeks, chin, lips, and forehead. There was anaesthesia of both forearms and hands, and of both legs from half-way below the knees. Both ulnar and both peroneal nerves were thickened. Numerous maculae were present. Both feet and ankles were cedematous.

Heiser's treatment was begun on this day.

At the end of 1916 the leonine expression was hardly noticeable, there was considerable absorption of the nodules, and the maculae had disappeared. The anaesthetic areas on the arms had lessened in size.

Gynocardate of soda was substituted on June 15, 1917. At the end of 1917 the condition was: Sensation complete. No maculae. No nodules. Some thickening of skin of face. Some oedema of hands and feet. Few *B. lepræ* in posterior nares.

Case (No. 3 in Report, 1916).—S. H., male, aged 40 years. Admitted September, 1905. Duration of disease, thirteen years. On admission, several maculae. Anaesthesia of right arm and right leg. Mutilation of all digits. Ulcers on right hand and right foot.

Nastin was given from December, 1910, until July, 1913.

In September, 1913, the maculae had disappeared. *Chaulmoogra* oil was administered from October 21, 1913.

On March 24, 1914, there was anaesthesia in both legs. There was a small ulcer on the right foot.

Heiser's treatment was begun in May, 1916, at which time there were: Anaesthesia both arms, from elbow downwards, both legs from knee downwards. Both popliteal and ulnar nerves thickened. Numerous maculae.

At the end of 1916 a few maculae were present on the abdomen only. There was some return of sensation, particularly in the left arm.

Gynocardate was given in June, 1917.

At the end of 1917 sensation was complete in the left leg and as far as the wrists in both arms. There were no ulcers, no maculae, and no nerve-thickenings. No *B. lepræ* were found in a smear from the posterior nares.

Case.—O. G., male, aged 30 years. Admitted May, 1909. Duration of disease, twelve years. On admission, maculae on trunk, active mutilation of digits.

Nastin injected from July, 1911, until July, 1913.

In September, 1913, there were still maculae, and there were ulcers on the fingers and toes.

Chaulmoogra oil was prescribed on September 8, 1913.

On July 27, 1914, there was a small ulcer under the right big toe. The maculae were fading. On January 30, 1917, the condition was: Maculae on face, head, and neck. Anaesthesia both forearms and hands, and both legs from below the knee. Considerable deformity of all digits. Ulcers, two on outer aspect left forearm, two on anterior aspect right leg. *B. leprae* in posterior nares.

Heiser's treatment begun.

July 24, 1917, gynocardate substituted. At the end of 1917 the maculae were fainter and smaller. Sensation was complete, except in the feet. Ulcers healed, except a recent minute one on right heel. No *B. leprae* found in smear from posterior nares.

Case (No. 4 in Report, 1916).—O. J., male, aged 30 years. Admitted October, 1913. Duration of disease, four years. On admission, maculae on face, neck, and chest. Deformity of digits. An ulcer in front of tibia.

By November 27, 1913, under carbolic dressings, the ulcer was healed, as were also several small ulcers which had appeared on the stumps of the fingers.

Chaulmoogra oil prescribed on January 1, 1914.

Heiser's treatment substituted on May 17, 1916, on which date the condition was: Anaesthesia both arms from elbow, right leg from ankle, and left leg from knee downwards. Both ulnar and peroneal nerves thickened. Ulcers at base of left middle and little fingers. At the end of 1916 sensation was complete in the right leg, and also in the right arm as far as the wrist. The ulcers were healed.

Gynocardate of soda substituted July 24, 1917.

This drug was given intravenously once per week. The initial dose was $\frac{1}{16}$ gr. On September 16, 1917, at which date the dose was $\frac{3}{16}$ gr., the treatment was stopped on account of the development of ascites and oedema of scrotum, legs, and hands. The patient died from this nephritis on December 28, 1917. Since admission in 1913 he had manifested, at various times, oedema of the legs and scrotum and puffiness of the face.

Possibly the gynocardate was responsible for lighting up the chronic nephritis.

Case (No. 7 in Report, 1916).—O. M., female, aged 40 years. Admitted August, 1897. Duration of disease, four years. On admission, maculae on both arms, pain and swelling left foot.

Chaulmoogra oil prescribed in 1902. During the previous five years ulceration and absorption of digits had proceeded.

Nastin was given from December 12, 1910, until August, 1912.

Chaulmoogra oil was again given in September,

1913. At this time all the digits were mutilated, and there was a large ulcer on the left side.

Heiser's treatment was begun on September 28, 1916.

There was then anaesthesia in both arms and in the left leg. Both ulnar nerves thickened. Maculae on upper arms. Two large ulcers on left side. At the end of 1916 the maculae had gone. The anaesthesia was confined to both hands and the left leg from below the knee. One of the ulcers on the left sole had completely healed.

Gynocardate was given on June 15, 1917. At the end of 1917 sensation was complete, but the healed ulcer on the sole had slightly broken down and the other ulcer remained. No *B. leprae* found in a smear from the nose.

Case.—P. A., male, aged 29 years. Admitted June, 1903. Duration of disease, ten years. On admission, opacity of cornea, almost blind. Ulcers on cheeks. Third right and second left toe absorbed.

Chaulmoogra oil prescribed in 1913.

In January, 1910, all digits mutilated. Totally blind. Anaesthesia both arms from elbow. Anaesthesia both legs from knee.

Nastin treatment was then begun.

In September, 1913, chaulmoogra oil was given in addition to the nastin. In November, 1913, the anaesthesia was limited to the hands and feet. No ulcers. Nastin and chaulmoogra oil stopped at end of 1913.

Heiser's treatment was started in May, 1916.

At that time there was anaesthesia in left shoulder, forearm and hand, right hand, and both legs from middle of thigh. Both ulnar nerves thickened. Maculae on chest and back.

At the end of 1916 there was some return of sensation, particularly in the left arm. The maculae were fading.

Gynocardate was prescribed in July, 1917. At the end of 1917 there were no ulcers, no maculae, no nerve thickenings, and sensation was complete except in the feet. No *B. leprae* found in a smear from the posterior nares.

Case.—I. S., male, aged 45 years. Admitted January, 1915. Duration of disease, sixteen years. On admission, blind in right eye, numerous maculae, mutilation of toes.

Gynocardate prescribed in August, 1917.

At the end of 1917 there were no ulcers, no maculae, no anaesthesia, no further mutilation. No *B. leprae* were found in a smear from the nose.

Case.—A. D., aged 40 years. Admitted August, 1912. Duration of disease, twelve years. On admission, leonine countenance, considerable mutilation of toes.

On July 31, 1917, there were ulcers on both heels, left arm swollen and eczematous.

Gynocardate prescribed on this date.

At the end of 1917 the ulcers were healed, left arm normal, no further mutilation, no anaesthesia.

No *B. leprae* were found in a smear from the nose.

Case.—L. M., male, aged 35 years. Admitted

July, 1911. Duration of disease, one year. On admission, leonine countenance, maculæ on trunk.

In December, 1915, there were numerous raised erythematous patches, generally distributed. *Gynocardate* prescribed in August, 1917, when the erythematous patches had increased.

At the end of 1917 the patches were less raised and less extensive, and there were additional signs of leprosy. No *B. lepræ* were found in a smear from the nose.

Case (No 6 in Report, 1916).—B. W., male, aged 25 years. Admitted April, 1916. Duration of disease, two years. On admission, maculæ on face, scalp, and neck.

Heiser's treatment prescribed in June, 1916.

At the end of 1916 there were two maculæ left, one on the left cheek, the other on the occiput.

Gynocardate substituted in July, 1917.

On September 13, 1917, his term of imprisonment expired. There remained only the faint outline of a macule on the occiput. No *B. lepræ* were found in a smear from the posterior nares.

Case.—O. S., male, aged 50 years. Admitted July, 1917. Duration of disease, fifteen years. On admission, "main en griffe" both hands, considerable mutilation all digits, ulcers on left hand and right foot, anæsthesia forearms, hands and feet, maculæ on chest.

Gynocardate prescribed in August, 1917.

At the end of 1917 sensation returned to forearm, ulcers on left hand and right foot healed, small ulcer on right hand, left foot, fingers can be moved freely. No *B. lepræ* in a smear from the nose.

Case.—O. D., male, aged 40 years. Admitted August, 1916. Duration of disease, sixteen years. On admission, deformity of all digits, anæsthesia left arm from elbow.

Gynocardate prescribed in July, 1917.

At the end of 1917 sensation was complete, no signs of active disease. No *B. lepræ* in smear from posterior nares.

Case.—A. E., male, aged 37 years. Admitted May, 1916. Duration of disease, ten years. On admission, mutilation of toes, ulcers on both feet.

Gynocardate prescribed in August, 1917.

At the end of 1917 one small ulcer right foot. No *B. lepræ* in smear from nose.

Case.—C. A., male, aged 35 years. Admitted December, 1916. Duration of disease, six months. On admission, face leonine, nodules on both ears. Maculæ on trunk. Abundant *B. lepræ* in nose.

Heiser's treatment begun in January, 1917.

Gynocardate substituted in July, 1917, when maculæ more prominent and nodules larger.

At the end of 1917 the maculæ were more numerous, the nodules were increased in size and number, there was "tingling" in both arms, and abundant *B. lepræ* in nose.

Methods of Treatment.—Nos. 2, 3, and 4 were carried out, in each case, as recommended by Professor Deycke, Surgeon Heiser, and Sir Leonard Rogers respectively.

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MARCH 1, 1919.

ORGANIZING THE CIVIL MEDICAL PROFESSION ON ARMY LINES.

THAT great organizer, administrator and thinker, Sir George J. H. Evatt, K.C.B., Surgeon-General (retired), in a letter to the *Lancet* in May, 1918, gave a short and concise, but yet a clear enuncia-

tion of how the civil medical men ought to direct their thoughts and energies in the matter of organization. It is not the first time this great reformer has spoken, and he has never yet spoken in vain. Throughout all his writings and speeches organization has been the keynote of his principles, and the model he takes, which he has done so much to create and develop, is the modern Royal Army Medical Corps. A fifty-year experience of the medical service of the Army has been the school in which he was educated, and from which he emerges with clear notions, framed and established upon an unshakable basis. He has from time to time given us the benefit of his matured thought in almost every department where community of interest has banded medical men together in isolated groups. We now seek to unite these groups into a common whole, with a single great centre to guide, to regulate, and to direct; a civil medical staff, in fact, on the model of the military medical staff. The unification of the civil profession is the real goal that we are aiming at; although amongst the everyday strivings, longings, petitions, and bickerings which we have been made familiar with of late years, it is difficult to believe that this is so. Everything has been and is developing, however, towards that great ideal.

The unification of the Army Medical Department which began in 1860 was but recently accomplished; a period of over fifty years of strenuous work and endeavour on the part of our military brethren. They fought out the great fight for the medical profession in the face of opposition, which was bitter in the extreme, for it had no precedent and no helping hand except right and justice. The men who carried on the fight in the Army are being honoured to-day by the erection of a memorial to be placed in the Royal Army Medical School at Chelsea, London. Their names are worthy of being remembered outside the Army, for as the Army medical men are regarded by the Army itself, so does the public status of the medical profession as a whole rise or fall in public estimation. The names of these pioneers in medical politics are: Sir William Muir, K.C.B.; Sir George J. H. Evatt, K.C.B.; James Beattie; William Johnson, C.B.; and Sandford Moore. Outside the Army these names are unfamiliar, and consequently un-honoured, but we, each and all of us in civil life, are benefiting by their victory over prejudice, and the status of every doctor in the realm has been improved by their strenuous and successful endeavours. Unification was their watchword. Only one of the five great men is left to us, and he—Evatt—continues to preach the doctrine with success behind him to stimulate him in his advocacy.

What do we find at present in civil life? Groups of medical men striving for their betterment. Panel doctors, prison doctors, Poor Law doctors, factory doctors, school medical officers, medical officers of health, and yet other groups striving for "recognition" for improved conditions, without support be-

cause of want of organization of the profession under which they serve. Their tenure of office regulated by men whose view of the doctor and his position is all too often that of one who is their servant, and who is to be engaged, dealt with, and dismissed according to the whim or fancy of this or that member of a board of guardians or other authority. The time will come when the doctor shall hold the authority, and he shall decide whether the member of the committee or board is fit to sit on that committee or board. But that time is not yet. The "guardian" at present is the authority who regulates public medical work, who, after experience gained in his shop or bench, considers himself fit to run a hospital, to judge its medical wants, to gauge the quality of the doctor, and bring him to book as to his treatment. It was thus in the Army before unification; the colonel of the regiment controlled the regimental doctor and assigned him his task and place; he had to take his instructions from the colonel and adjust his treatment in accordance with his whims and fancies. The moment the regimental doctor was controlled by the Central Medical Staff, however, the colonel's authority ceased, and medicine asserted itself in the sphere which belongs to it naturally.

We want then a Central Civil Medical Staff; where neither the baker nor the butcher shall decide upon medical matters, and until that is elected and placed in command the civil profession will continue as sheep without a shepherd, and as servants of a feudal system with all its iniquities.

It is useful here to repeat some of Sir George Evatt's points in regard to the advancement of the Army Medical Department:—

The Army Medical Service introduced the "double medical qualification" in 1860 and thus linked together the physician and surgeon classes of medical practitioners. Before that date any medical man could be "nominated" for the Army Medical Service on the strength of a single qualification in either medicine or surgery. The profession as a whole followed the Army example after many years' delay and the "double qualification" is now the rule.

Public competition was introduced for the Medical Service of the Army in 1860 and private patronage ceased. The R.N. Medical Service followed suit, as likewise the Indian Medical Service. At the present moment private nomination is in force for the Colonial Medical Service and the Prison Medical Service and other minor groups. In my opinion candidates for such services should compete in the Army medical examinations and be granted appointments in these smaller services only if they pass the *qualifying* standard for the Army.

Sanitary Training.—Since 1860 every entrant into the Army Medical Service is given a sanitary course of lectures for several months on joining. Educated by these courses two great streams of trained sanitary medical officers have gone out over the Empire to preach sanitation through our foreign

garrisons, and in a special manner to awaken India through the Indian Medical Service. It would well repay the State to endow, either fully or in part, the hygiene department of our Medical Schools and Colleges, and so reduce to a very low rate the financial charges for sanitary training of medical men, for which students now have to pay. Practically no scholarships or exhibitions exist for the public health students, a lamentably retrograde condition of affairs.

Finally, the Army Medical Service, once broken up in petty regimental groups, has become a centralized corps. It wants but little imagination to see that a similar centralization will in a measure come upon the civil medical profession, and the cry for a Minister of Health is the visible mark of this unifying spirit. The Poor Law doctors will be linked up with the panel services and the school doctors will also join in, and one day the county medical officer of health will become the medical director of the county—controlling and co-ordinating all the various county medical groups under one medical administration. His position will be like the principal medical officer of an army now called the Director of Medical Services. Nothing can prevent this certain unification. Into it the Panel Medical Service will no doubt one day lapse.

Whilst admiring and willing to follow the system which obtains in the military branch of our profession, it is well to avoid any pitfalls that it may involve. There is no doubt there is one great danger that stands forth pre-eminently.

The Army system is really a sanitary one, magnificent in its conception and successful in its working. Civil practice is a purely clinical system, so that whilst willing to follow the system which obtains in the military branch of the profession of medicine, this can only be the case up to a point, and here the great diversion between military and civil practice arises. In the Army the senior members of the medical department become executive officers. Administration is their daily task, which, commencing when a man attains his majority, continues throughout the remainder of his career in the Army. Clinical work is outside his duty, and beyond inspections he never sees the inside of a hospital ward. The knowledge of his profession as he advances in years gets less and less every year he lives, until at a time of life when in civil life a man is of value as a consultant, the opinion of an Army man is well-nigh worthless. He has become an expert administrator and sanitarian it may be, but of clinical work he is practically ignorant. This inevitable end to a career leads to little else than a retiring pension at about 60, for in civil life he is not sought after, and his knowledge is of little use to the community. In civil life the man who retires from hospital work at 60 is in his prime as far as clinical knowledge is concerned, and he is eagerly sought after as a consultant.

This divergence of paths in the careers of medical men in the Army and civil life after—say, the age

of 40—is the cause of many heartburnings on the part of Army medical men throughout the Empire. Officers when they want an opinion from men of experience avoid the senior men in their own service and go to civil men of reputation as clinicians; this leads to bitterness between the service and civil doctors, and at times leads to recriminations. But it is the effect of the system in vogue in the service, for whilst they have produced a first-class administrator and sanitarian, there is not, and cannot be, under the present system, a military or naval medical officer in the senior ranks who is of high value as a consultant in the sense that obtains in civil life. It may at once be asked: Cannot this be remedied? Cannot there be within the services a clinical side to be followed instead of an administrative side only? In the Indian Medical Service such a state of things exists, but in the R.A.M.C. it is difficult to see how it is to be done. In India this divergence occurs and affects a man after a few years in the service, for he has to choose to take up what is called the civil as opposed to the regimental or military side of his service. Practically all take up the civil side in the Indian service, the reverse of what happens in the R.A.M.C., where there is no civil side to follow as in India. The fact is, therefore, that the Army system turns out a first-rate administrator at, say, the age of 60; whereas in civil practice a man of the same standing becomes a consultant of value in the field of clinical medicine and surgery.

It is thus seen that, whilst urging the civil practitioners to organize themselves on military lines, the system is at present applicable only where public work is being done, whether as Poor Law officers, prison doctors, health officers, &c. The Army medical system affords us no guide beyond this, and still leaves the question of experienced clinical consultants unsolved, and perhaps unsolvable. The way out of this is easy enough on paper, but in practice it is difficult. The Army officer who would take up clinical work in the Army has but a meagre opportunity of obtaining experience in clinical medicine and surgery. His patients are obtainable from a community of men almost exclusively, for the women and children form but a small section compared to that which civil practice affords. Moreover, the men are young men chosen for their good physique, their surroundings are watched by experienced sanitarians, their food, their housing, their clothing, &c., prescribed for, and illness when it occurs is reported at once and brought under observation and treatment. There is, therefore, a gulf between military and civil work in regard to clinical work which cannot be bridged by any system in vogue at present; a new organization and system is required; readily enough done in theory, but when applied to general practice so as to form a State service requires modification and careful handling. The State, if it is to deal with this question and to form a purely State service with no medical men outside its jurisdiction, must

remember that in clinical medicine and surgery experience is everything, and that the goal that should be aimed at is to produce consultants of ripe experience for the public good. A man of the type wanted cannot be a young man, but a man of, say, 50 years of age and upwards; the age at which accumulated experience is alone possible or of value. In the Army at present a man of this age is retired, and he retires without the knowledge which is of any value in civil practice, nor is it possible for him to gain that clinical experience necessary to compete with a physician or surgeon trained in our great civil hospitals.

The problem of State control of medicine must decide whether or not all qualified men are to be compelled to belong to it, or is there to be option in the matter. If all are to be made to join, the State must recognize the fact that unless the senior men are to become consultants in the sense which obtains to-day medicine will suffer, the public will suffer, for experience, the one vital point to which all medical education should tend and be directed, will be neglected and slighted. No one should be graded a State consultant under the age of 50, 55, or 60, the age at which men are mostly retired from the Army Medical Service at present, but which if applied to a State Civil Service would cut short the career of medical men who are of the greatest service to the State at any period of their career.

J. C.

Report.

HONG-KONG.

REPORT ON THE INVESTIGATIONS OF THE OUTBREAK OF EPIDEMIC MENINGITIS IN HONG-KONG BY FIRST LIEUTENANT PETER K. OLITSKY, M.R.C., U.S.A., OF THE ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH, NEW YORK.

Laid before the Legislative Council by Command of His Excellency the Officer administering the Government, October 17, 1918.

(Concluded from p. 36.)

DURING January, 1918, increased numbers of cases were reported at the mortuary, but no actual diagnosis of epidemic meningitis was made until February 9, 1918. As I have already stated, the assumption that the epidemic started at least a month before this time seems to be well grounded. During the rest of February the cases were increasing in number (six to eighteen were reported daily). During March there were, as a rule, ten to twenty-four cases per diem reported; during April, six to fifteen; during May, three to seven, and during early June the average number was about three. The epidemic started in January, reached its height in March, and declined gradually in April, reaching its low level in June.

(b) *The Number of Cases and the Mortality.*—Up to June 1, 1918, there were 1,041 patients reported. Of these only four were European. The 1,037 cases include, with the exception of a few Portuguese, Chinese exclusively. For the purposes of epidemiological study the Portuguese and Chinese are grouped together on the basis that the former, although living apart from the natives, exist under very crowded conditions. This number, 1,041, does not represent the actual number of cases. Many of the patients were "missed." On account of the mildness of the disease in many individuals the diagnosis may have been overlooked. On the other hand, many Chinese who sought native healers and subsequently recovered were never placed on record. The actual number is undoubtedly much greater, but it is impossible to approximate the figures.

Therefore the total mortality, which is computed at 76.1 per cent. for the first 1,000 cases, does not represent the actual mortality, which, of course, would be lowered in view of the number of missed cases.

(c) *The Influence of Age and Sex.*—From the Tung Wah Hospital records of 417 patients, the ages of patients ranged from four months to 59 years; the average age was 22.68 years. The number of affected males was slightly over twice that of the females. In a series of the first 750 cases the incidence according to age is from infancy to 5 years of age and at 17½ years, the latter especially for males. It is apparent that the susceptible elements of the population are children and young adult males.

(d) *Influence of Meteorological Conditions.*—The temperature, the mean as well as the wet-bulb (temperature of saturation), had a marked influence on the incidence of the disease. In general terms it may be stated that when there occurred a sudden drop of temperature the number of cases increased, and when there was a rise in temperature the incidence of epidemic meningitis declined.

As a rule, about four days after a sudden drop of temperature there was a great increase in the number of cases reported. On the other hand, rising temperature was usually followed by an amelioration of the epidemic.

The influence of sunshine also made an impression upon the number of cases. Reversely, the lack of sunshine showed an increase in the returns. For example, February 28 and March 1 showed practically no sunshine, March 2 four and a half hours, March 3 one hour; in other words, five and a half hours of sunshine in four days. Three days later twenty-three cases were reported, the greatest number reported for a day with the exception of one. There was practically no sunshine for four days from March 26; on the fourth day after this period twenty-one cases were reported, although from five to fifteen cases were the rule for the previous week. Thus we see that the lack of sunlight shows a relationship to the increase in number of cases.

It is doubtful whether humidity or rainfall by themselves have any bearing on the number of

cases. January and February were extremely dry months. Indeed, the rainfall was considerably behind the average for several years. Yet February saw increasing numbers of cases, and March, with relatively small amount of rainfall, showed the greatest number. Recently rainfalls were heavy, but the corresponding number of cases was not influenced.

(e) *Pre-epidemic Infectious Disease.*—It is a matter of common knowledge amongst the practitioners, although no official records are available of the great number of cases of influenza and sore throat prevalent in the colony during the period preceding the epidemic (November and December, 1917). The Principal Civil Medical Officer states that an unusual number have come to his attention. This is attested by Dr. Jordan, the Medical Officer of the port, Dr. Macfarlane, the Government Bacteriologist, and Dr. Gale, the Medical Officer of Health. The epidemic was not severe in its effect, but the distribution of these ailments was quite general. On the other hand, there is no evidence of any great increase in measles at the time nor mumps. Besides the prevalence of sore throat and influenza the health conditions of Hong-Kong were relatively good.

(f) *Migration of the Population.*—Migration may be an important element in the dissemination of the disease as well as in the recurrence or continuance of an epidemic. As for the first, namely, the dissemination of epidemic meningitis, there occurred in the ports of Swatow, Shanghai, Kobe, Osaka and Tokyo an extraordinary number of cases (and in most instances were recorded for the first time). These cities are along the main lines of travel out from Hong-Kong. The cases occurred a few weeks after the outbreak at Hong-Kong. For example, at Swatow about sixty cases developed during March. The Hong-Kong Blue Book for 1916 and 1917 places the emigration from Hong-Kong at 117,653 and 96,298 respectively.

On the other hand, the question of recurrence or continuation of an epidemic is related in a degree to the immigration. The immigration into the colony for 1917 was 98,232. It has been pointed out that the entrance of a new susceptible element of population from a non-infected district into the epidemic area of the colony, and this new element, usually coolies, existing in close contact with the disease, will tend to increase the number of cases. Or they will cause a disturbance of the insusceptible ratio of the normal native population, and when the cold season approaches, or under other conditions favourable to the spread of epidemic meningitis, there will be new soil for an outbreak.

(g) *Geographical Distribution of Cases.*—It is of interest to note that while it was of rare occurrence that more than one member of a family was afflicted, yet the disease showed its greatest number of cases in limited areas.

All these areas correspond to the most crowded sections of Hong-Kong and Kowloon. In areas where there is no crowding, there were none or comparatively few cases developed.

(h) *The Overcrowding of the Population.*—As the disease was limited to a great degree in the overcrowded sections, it is important to investigate this phase of the epidemiology of epidemic meningitis.

Three causes operate to effect overcrowding. In the first place there are too many houses on too small a space, in this way causing structures to be in close proximity. In turn this gives rise to insufficient ventilation and for the most part very little light. The alleyways and the streets or lanes are so narrow and the houses are so high (in proportion to the narrowness of the street) that not only ventilation and light become deficient, but the air is always damp from wetness of the passageways. They are never thoroughly dry, possibly from the position of the Chinese community, namely, at the foot of the hills where the water from the higher altitudes is continually settling.

In the second place, there are no arrangements for ventilation within the house.

(1) *Contact Carriers.*—Drs. Macfarlane and Earle's investigations extended from March 11 to May 13, and include cultures made as routine examinations of contacts with patients for the presence of the meningococcus in the naso-pharynx. It appears that the work was very carefully done; only a few cultures were examined at a time, and all plate cultures contaminated with saliva were discarded. The criteria for recognition of the meningococcus were: (1) Typical colony morphology; (2) absence of pigment; (3) acid production in dextrose and maltose and not in saccharose medium; (4) typical morphology by Gram's stain; (5) ready emulsification of the growth of subcultures. No agglutination tests were made, however. Sheep-serum water (one part to two parts water) 20 per cent. agar, was used for the plate cultures.

Examining contacts of several patients, they found that: 71 Europeans yielded seven carriers (9.8 per cent.); 133 Chinese yielded nine carriers (6.7 per cent.), making a total of 204 yielding sixteen carriers, or 7.8 per cent.

This is on the basis of a single examination.

The ratio of incidence of meningitis amongst the Europeans is as 1 : 1250; in the case of the Chinese as 1 : 509. The carriers are more prevalent among the Europeans, notwithstanding the fact that fewer were afflicted.

(To be continued.)

PLAGUE mortality in India during December, 1918: Bombay City, 6 deaths; Bombay Presidency, 778; Madras Presidency, 571; Bengal Presidency, 1; United Provinces, 227; Punjab, 194; Burma, 355; Bihar and Orissa, 347; Central Provinces, 235; Hyderabad State, 717; Mysore State, 573; Central India, 27; Rajputana and Ajmer-Merwara, 9. No plague reported elsewhere. A grand total for all India of 4,040 deaths.

Original Communications

REMARKS ON DYSENTERY IN EAST AFRICA.

By JAMES C. WATT, M.B.

SINCE the beginning of the War much has been written about dysentery, and to anyone who has served in a campaign in countries where dysentery is endemic, there will be nothing surprising in this.

There has also been much controversy lately as to the relative frequency of occurrence of the various known causative organisms, and particularly of amœbic and bacillary dysentery. From personal observations in West Africa and in East Africa during the campaign there, I have been gradually persuaded that the proportion of amœbic dysentery is really much greater than is generally supposed.

I believe there are two principal reasons for our misapprehension—if such exists—of the true frequency of pathogenic amœbic infection. Of these the most important is that the histolytic amœba or its cysts may be very difficult to find, even in acute cases, by the ordinary method of examination of fresh dejecta, and that in chronic cases it is nearly always so.

I think all observers in England who have studied chronic cases from the various theatres of war agree that the finding of histolytic amœbae or their cysts, even in cases previously diagnosed as amœbic dysentery, is by no means easy, and that results are variable from day to day.

The second reason I believe to be that secondary infection with dysentery-causing microbes is frequent in cases previously amœbic.

This is, of course, hypothetical, although mixed infection with *Entamoeba histolytica* and *B. dysenteriae* are recognized.

I will now relate my experience of the disease in East Africa under active service conditions.

From May, 1916, to January, 1918, being for the most part of that time in the field with fighting units, I had abundant daily experience of dysentery as it affected our troops there. The period May, 1916, to December, 1916, was of particular interest, as I was then attached to white troops, most of whom were new to the Tropics.

Throughout that period the clinical symptoms and signs of cases of dysentery were those of the amœbic disease. [N.B.—This remark does not apply to the naked-eye appearance of the stools, as I shall explain later.] The disease corresponded with that I had previously been familiar with in Gambia.

During September, October, and part of December, 1916, I had the opportunity, which I believe to have been unique for the East African campaign, of making microscopical examination of acute cases as they occurred amongst the fighting troops—that is, I was able to examine microscopically the dejecta of men (whites) who were attacked by dysen-

tery for the first time within a few hours of their leaving trenches or of falling out on column.

This factor I consider to be of great importance, as I hope to show.

My findings were, principally, that by far the greater proportion of cases of dysentery then occurring amongst the troops were amœbic.

In a series of cases (forty) I examined in standing camp in October, 1916, I found that 75 per cent. were of the amœbic type.

I now come to the question of standard of diagnosis.

In "Human Intestinal Protozoa in the Near East," by Temp. Lieut.-Colonel C. W. Wenyon, R.A.M.C., and Temp. Capt. F. W. O'Connor, R.A.M.C. (published for the Wellcome Bureau of Scientific Research, London, by John Bale, Sons and Danielsson, Ltd.), it is laid down that diagnosis of amœbic dysentery can only be made on the examination of fresh dejecta, when amœbae of the histolytic type are found showing included red blood corpuscles, or, when cysts of the histolytic type are found in association with free entamœbae, of histolytic form. In other words, entamœbae should not be diagnosed as histolytica (in the absence of cysts) unless they contain red blood corpuscles.

This is doubtless an essential standard, and I refer my remarks to the work of Colonel Wenyon and Captain O'Connor as being the most recent and most authoritative work on the subject.

In a short report (1916) to the D.M.S., East African Expeditionary Force, on my cases, I stated that "a positive diagnosis was only made where examination showed either active amœbae of histolytic type, or adult quiescent histolytic amœbae together with cysts" (1-4 nuclear). By "active amœbae of histolytic type" I meant amœbae showing distinct ecto- and endo-plasm, of greenish yellow tinge, and making active movements.

Now even in acute cases it is not always easy to find amœbae showing definite included R.B.C.; but if in acute dysentery one finds entamœbae of the histolytic form with definite yellow tinge, and showing the explosive type of movement, these are almost certainly *E. histolytica*.

At the same time I was often able actually to observe the process of ingestion of R.B.C. by entamœbae.

To see this process under a $\frac{1}{2}$ objective lens in tropical heat, in a specimen of dejecta from an acute case, and within a few moments of its being passed, is to have a new idea of the capabilities of the *Entamoeba histolytica* in producing rapid ulceration.

I recollect observing one case, of which I have notes, in the dejecta of which I watched under the $\frac{1}{2}$ in. a single entamœba ingest R.B.C. at the rate of six per minute. This individual continued to feed, at intervals, for about half an hour. It is impossible to give an adequate idea of the appearance of ferocious vigour which this creature exhibited. It

seized its food with violent speed. So quickly sometimes were the pseudopodia thrown out to seize a corpuscle that the eye could not follow completely the act of ingestion. The corpuscles were often so violently seized and swallowed that they were lengthened and nipped in the process, thus:—



The act seemed to be completed by high negative pressure or "suction," the prehensile process or pseudopodium being tubular. This phenomenon, I imagine, cannot be seen unless in the most acute cases, and in hot, damp weather in the Tropics for this reason: that in these cases, owing to the rapid and frequent evacuation of the bowel, the entamoeba may appear on the microscopic slide in close proximity to R.B.C., which its activities have set free from the capillaries and vessels in the ulcerations, a few moments only having elapsed between its removal from the floor of the ulcer to the slide, and without having its activities damped by any change in the temperature, pressure, or fluid tension of its medium.

In the examination of less acute cases, or acute cases in which the symptoms were beginning to abate, I found that the proportion of entamoebae still feeding, or showing recently ingested R.B.C., was relatively smaller. In other words, the amoeba in the ulcerations were as a whole less voracious, and less likely, therefore, to exhibit definite included R.B.C. on being examined in the dejecta.

For this reason I am strongly convinced of the advisability of increasing facilities for direct observation of the dejecta at the earliest possible moment after the onset of the disease in individual cases.

The findings, however, of observers in base hospitals did not in the least seem to support the opinion that amoebic was the prevailing type. On the contrary, the returns given by base hospitals generally showed that bacillary dysentery was predominant, these returns being, of course, based on laboratory findings.

It will, however, be admitted by all who are familiar with this subject that the chance of finding *E. histolytica* or its cysts in chronic or subacute cases, who have been under various treatment for days, weeks, or even months, with much saline evacuation of the bowel, is slight. These are the sort of cases which formed the greater part of dysenteries in base hospitals in East Africa at least. At the same time I was informed by Lieut.-Colonel Balfour, C.M.G., R.A.M.C., in January, 1918, that a competent observer, working in a native carrier hospital at an up-country station, had recently

found a percentage of forty-four amoebic in a series of cases examined.

Doubtless the cases examined by this officer were much more frequently acute than those observed in base hospitals on the coast. This, it seems to me, explains quite sufficiently the difference in results obtained.

I now suggest what I believe will be found to be the truth. That in the Tropics infection with *B. dysenteriae* is frequently added to pathogenic amoebic infection.

Clinically, there is some support for this hypothesis. Thus I have frequently noticed that in the initial stage of amoebic dysentery, after the faecal contents of the bowel had been discharged, the dejected material consisted of perfectly clear glassy mucus streaked with blood, and in this stage I have had many striking unobscured views of *E. histolytica* moving actively and containing recently ingested R.B.C. Yet, on the second or third day of disease, the dejecta have become markedly white, and have shown microscopically a profuse and varied cellular exudate, which rendered the observation of amoebae most difficult.

In short, the dejecta assumed the character generally ascribed to those of bacillary dysentery in cases which had already been found to be of amoebic origin. The profuse discharge of pus cells and various larger cells I take to be merely the expression of general secondary microbial infection.

This was a common experience, and where infection by *B. dysenteriae* is added to the general secondary microbial infection of amoebic ulceration, it is easy to understand that the findings with regard to relative frequency of *B. dysenteriae* and *E. histolytica* infections may vary greatly according as the majority of cases examined are acute initial attacks or chronic and subacute. The usual description, in fact, of the dejecta of amoebic dysentery I take to be really that of the subacute attack, or of the exacerbation of a pre-existing ulceration. Here the dejecta are most frequently dark, and the mucus and blood are fairly generally mixed with brown faecal fluid; but this, I suggest, is not at all typical of the truly acute attack, which exhibits first a fluid faecal stool, followed by a small stool consisting of remarkably clear glassy mucus streaked with blood, this becoming whiter and denser as the cellular exudate increases.

Now it may be objected that these cases of mine, although they showed *E. histolytica* in its most active and aggressive form, may have been simultaneously infected with *B. dysenteriae*, for, of course, in the field it was impossible to carry out bacteriological examination.

But to anyone who saw the wonderful effect of emetin injections on these cases—of men bedded, in grass huts, on grass spread on the ground, being given often of necessity a diet painfully unsuited to their condition, and being sometimes wetted and chilled by tropical rains, against which one could offer them no adequate protection—there can

remain little doubt that their disease was produced entirely, or at least mainly, by the ravages of the *E. histolytica*.

I shall now discuss briefly the treatment of amebic dysentery, and particularly treatment by emetin.

There is now no doubt that emetin, however exhibited, is deadly to the invading *E. histolytica*. At the same time, it is admitted that relapse in amebic dysentery is a most noticeably frequent occurrence. The general practice is to give doses of emetin varying from gr. $\frac{1}{2}$ to gr. $1\frac{1}{2}$ per diem, either by subcutaneous injections or by the mouth, or by both of these methods. The study of the question of emetin treatment in the work of Wenyon and O'Connor, already quoted, is admirably clear (Part III). It seems evident that the best results are obtained by subcutaneous injections combined with dosage by the mouth. But to my mind all recognized methods of treatment that I am familiar with fail in one essential respect, and that is, that they are of insufficient duration. I find it difficult to understand why the practice of defining the period of administration of emetin to a certain number of days should have been instituted.

In my report already referred to I suggested to the East African authorities to give emetin in cases diagnosed as amebic for a minimum of fifteen days by subcutaneous injection of gr. 1 per diem. I had been of the opinion for some time that the only inadequacy of emetin treatment was that of duration. It is now most encouraging to find that Colonel Wenyon and Captain O'Connor are of the same opinion, although they do not, I think, sufficiently emphasize the point.

The observations of these authors seem to point to one conclusion, that it is of the gravest importance to prolong the administration of emetin in individual cases to a degree that has not yet been generally practised.

One case that occurred in 1915 is, I think, of interest in this connection.

A young man, a native, was admitted to the Colonial Hospital, Bathurst, suffering from dysentery. I found active *E. histolytica* in his stool. He was given emetin gr. 1 per diem for about seven to nine days, the symptoms disappearing about the third day of treatment. (The notes of this case are not at present available.)

In four to five days after the cessation of emetin treatment the man became fevered and complained of pain in his mouth. A right upper molar was carious and loose, and the surrounding mucous membrane inflamed. The condition grew worse, until in about three days in all there was intense inflammation extending into pharynx, ulceration of the palate adjacent to the right molar, with necrosis of bone in the base of the ulcer, all in spite of energetic local antiseptic treatment.

I then, without finding entamæbe in the mouth, recommended the emetin treatment, giving him gr. 2 the first day, followed by gr. 1 per diem. The effect was most striking. In twenty-four hours all

surrounding oedema of mouth and pharynx had subsided, the temperature had fallen to normal (having been continuously elevated since the onset of the buccal condition), and the margin of the ulcer was seen to be healing. Eventually separation of necrosed bone in the floor of the ulcer took place, and the whole lesion closed.

The man remained well. Although I failed to find any entamæbe in the dense discharge from the sore, I have no doubt that the condition was local amebiasis.

Further, in one case of dysentery in East Africa I found active *E. histolytica* containing remains of R.B.C. on the fifth day of treatment with emetin gr. $1\frac{1}{2}$ daily.

I am therefore of the opinion that the practice of giving emetin in amebiasis only fails in that it is not generally sufficiently prolonged. To this it may be objected that emetin may produce toxic symptoms, especially if the administration be long continued. I can only say that, although I have used emetin extensively both in West Africa and in East Africa, and have given it in full doses (gr. $1\frac{1}{2}$ per diem) over periods which might be considered by some to be excessive, I have never yet seen any ill-effects that could be definitely attributed to emetin, or which could not be merely the result of disease and low diet. With regard to the depressant effect on the heart that emetin is said to produce, it is my experience that the same symptoms are to an equal degree produced by dysentery in the absence of emetin treatment. Again, it has been stated that emetin produces a feeling of weakness and stiffness in the muscles when given in ordinary doses. Touching this, I will relate my own personal experience.

In September, 1916, I suffered an acute attack of dysentery, and found both *E. histolytica* and *E. coli* in my stool. I took emetin gr. $1\frac{1}{2}$ subcutaneously for ten days. The acute attack lasted five days. During my convalescence, the column being on the march, I marched or rode ten to fifteen miles per day. I suffered from tachycardia and shortness of breath and stiffness in the muscles, but the latter was most noticeable in the calves of the legs and the anterior muscles of the thighs—that is to say, the muscles most liable to suffer fatigue by marching or walking about camp. The stiffness, which was distinctly painful sometimes, was much more severe at night after marching or riding all day. I concluded that my condition was fatigue, excessive only on account of insufficient diet and poor circulation.

(Cf. Wenyon and O'Connor, *op. cit.*, p. 120: "Case Spiers, who had a 12-gr. course of emetin while he carried on his regular office work, noticed this weakness, *especially in the legs*." The italics are mine. Here, I think, the authors wrongly attribute the symptom to the drug.)

AMEBIC DYSENTERY IN OTHER WAR THEATRES.

If my surmise is correct—namely, that a sys-

tematic microscopic examination in the field of acute cases of dysentery (particularly initial attacks) would reveal a much higher percentage of amœbic (*E. histolytica*) infections amongst all cases of dysentery than present returns show, it seems that the history of amœbiasis in the Gallipoli campaign is significant.

Certain officers, working either on the peninsula or at Mudros, i.e., making their observations as early as possible after the onset of the disease in their cases, stated that the bulk of the dysentery there was amœbic. Their opinion was later reversed by observers working in Egypt and at home, who ascribed the majority of cases from Gallipoli to bacillary infections.

This seems to me to be at least worthy of further inquiry, as it offers a parallel to what I have already noted with regard to East Africa. Again, in East Africa one of the most striking phenomena in connection with dysentery there during the campaign was the marked and sudden fall in the number of cases immediately following the onset of the rains.

During the dry weather troops marched and fought in a cloud of dust. After the onset of the rains the air was rendered clear and sweet. But as well as allaying dust, the rains at once reduced the number of flies which had swarmed about men on the march and had infested camps.

I was much interested to read in Mr. John Masefield's "Gallipoli" the author's remark that the coming of rain in Gallipoli seemed to put a stop to the dysentery which had been raging there.

These facts in themselves suggest that in both campaigns amœbic was the prevailing type of dysentery. Hot, dry weather is inimical to the spread of bacillary dysentery, whereas amœbic infection is worse in the dry season of most countries where it is endemic.

I shall summarize these remarks as follows:—

(1) That amœbic dysentery has been a much more common infection in recent campaigns than is generally believed.

(2) (Hypothetical.) That bacillary dysentery is frequently secondary to amœbic ulceration of the bowel.

(3) That microscopic examination of dejecta of dysenterics should be made on the earliest possible date after the onset of symptoms.

(4) And that each examination is more reliable than any subsequent examination can be in determining the nature of the initial cause of ulceration of the bowel.

(5) Maximum activity of *E. histolytica* is only likely to be observed in the early stages of the most acute cases under suitable conditions of temperature, &c.

(6) Treatment with emetin and other means not generally sufficiently prolonged in original attacks to allow of complete healing of ulcerations.

(7) A minimum of fifteen days' treatment with emetin gr. 1 subcutaneously each day is suggested

as a routine method, followed, if necessary, by further emetin treatment by the mouth.

(8) That the toxic effects of emetin have been exaggerated.

A PECULIAR GROUP OF THE COCCACEÆ.

By ALBERT J. CHALMERS, M.D., F.R.C.S., D.P.H.,
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AND

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Khartoum.

CONTENTS.—Introductory—Peculiar Coccid Group
—Classification—Genus Janus—Species of Janus
—Summary—References.

Introductory.—The study of the various groups of Zopf's family Coccaceæ has occupied this laboratory for a number of years and papers have been published dealing with the organisms of epidemic cerebrospinal meningitis, with the various pathogenic organisms belonging to the genus *Streptococcus* which have been found in the Sudan, and more recently work has been begun and is in progress with reference to the group *Diplococcus*, which includes the organisms causing pneumonia.

We have also shown that the organism which is the ætiological cause of "Nile Boils" in the Sudan is *Aurococcus mollis* Dyar, and we have confirmed this by a very large number of observations and supported it by the excellent results obtained by vaccine therapy with this organism.

During these various studies we have from time to time met with peculiar diplococcal-like or streptococcal-like organisms which contain elements some of which are frankly Gram-negative while others are Gram-positive.

The majority of the elements appear to be Gram-positive, while the Gram-negative portions are but few and are best seen in preparations made directly from the human body whether obtained during life or after death.

We have come to the conclusion that these elements are neither due to accidents, nor to age, or spore formation, but are rather integral features of the organism, because they occur in preparations made from the living body and are to be found in the first young cultures, especially in fluid media.

Up to date of writing we have found these organisms in the meninges and cerebrospinal fluid of cases of cerebrospinal meningitis, in the nasopharynx of cerebrospinal contacts, on the tonsils of a fair number of cases of severe tonsillitis, and in the blood of one case of septicæmia.

As far as we know no attempt has hitherto been made to invite attention to organisms of this nature, and it is solely for this purpose that we bring forward the present short paper.

Peculiar Coccid Group.—As just stated, we have obtained from the human body diplococci as well as short and long streptococcal chains which con-

tain Gram-positive and Gram-negative elements, and have illustrated an example of these, Plate II of a paper on Epidemic Cerebrospinal Meningitis, published in this Journal on May 1 and May 15, 1916, under the heading "*Diplococcus crassus* von Lingelsheim 1906."

We have found these organisms in three groups of cases, viz., Cerebrospinal Meningitis and contacts thereof, Tonsillitis, and one case of Septicæmia.

The characters of the organisms obtained from these three groups of cases may be tabulated as follows, the acidity being represented in terms of N/20 KOH:—

STRAINS		CEREBROSPINAL MENINGITIS	TONSILLITIS	SEPTICÆMIA
Morphology		Long chains, no capsules	Long chains, no capsules	Long chains, no capsules
Size of coccil element		about 1 micron	about 1 micron	about 1 micron
Gram		Positive and negative	Positive and negative	Positive and negative
Anaerobic Cultures		Growth	Growth	Growth
Pigment		O	O	O
Agar Agar		Small greyish white colonies	Streptococcal- like colonies	Streptococcal- like colonies
Blood Serum		—	Streptococcal- like colonies	Streptococcal- like colonies
Broth		Clear with deposit	Clear with deposit	Clear with deposit
Gela- tine	{ Growth Liquefac- tion	Slight growth O	Growth O	Growth O
Monosaccharides Hexoses Pentose	{ Glucose ...	1·6	8·6	2·2
	{ Fructose ...	1·3	5·0	3·3
	{ Galactose ...	1·9	5·4	3·2
	{ Rhamnose ...	0·9	0·0	1·4
Disac- charides	{ Maltose ...	1·2	3·4	3·9
	{ Lactose ...	1·8	0·8	1·8
	{ Saccharose ...	2·5	4·9	2·5
Trisac- charides	{ Raffinose ...	2·2	0·0	2·6
Polysac- charides	{ Dextrin ...	0·0	0·0	2·2
	{ Inulin ...	0·4	8·7	1·5
	{ Starch ...	0·0	0·0	1·0
Gluco- side	{ Salicin ...	0·3	4·9	1·8
	{ Glycerol ...	1·5	0·4	1·6
Alcohols	{ Erythrol ...	0·4	0·4	0·9
	{ Adonitol ...	0·1	0·3	0·3
	{ Mannitol ...	0·0	0·0	2·7
	{ —————	A & C	A & C	A & C
Milk		O	O	O
Neutral Red		O	O	O
Hemolysis		O	O	O
Bile Salt		O	O	O
Sulphuretted Hy- drogen		—	O	O

It must be noted that no gas was produced in any medium. We have not tested their pathogenicity on animals.

Classification.—It is sufficiently obvious that all these organisms belong to Zopf's family *Coccaceæ* as modified by Migula, and that they must be classified in the tribe *Streptococceæ* Trevisan 1889 emendavit Winslow and Rogers 1905.

As they do not produce pigment, they cannot be classified in the genera *Aurococcus* or *Albococcus*, as they do not occur in zooglæa masses they are not *Ascococcus*, and as they are not frankly Gram-negative they cannot be considered as belonging to *Neisseria*.

As they exist in chains, non-encapsulated and not soluble in bile or salt solutions, they might be classified in the genus *Streptococcus* Rosenbach 1884, but the species of this genus are entirely Gram-positive, while the organisms which we are considering contain frankly Gram-negative elements among the absolutely Gram-positive cocci.

As we have frequently noted references in medical papers to these organisms, and as we think that it is of use to distinguish them by a name, we call the group *Janus*.

Genus *Janus*.—This new genus of the *Coccaceæ* may be defined as follows:—

***Streptococceæ*.**—In chains, Gram-positive with Gram-negative elements in specimens taken direct from the human body during life and in pathological specimens obtained post mortem and in early cultures, without pigment formation, not forming zooglæa masses and not soluble in bile or salt solutions.

The position of the genus in the family *Coccaceæ* may be gathered from the table on the following page:—

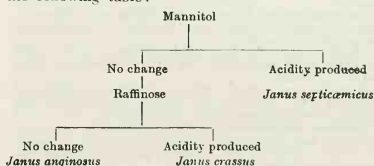
Species of Janus.—The following biochemical species may be differentiated:—

***Janus anginosus*,** new species.—This is found in sore throats, and is characterized by fermenting Mannitol but not Raffinose.

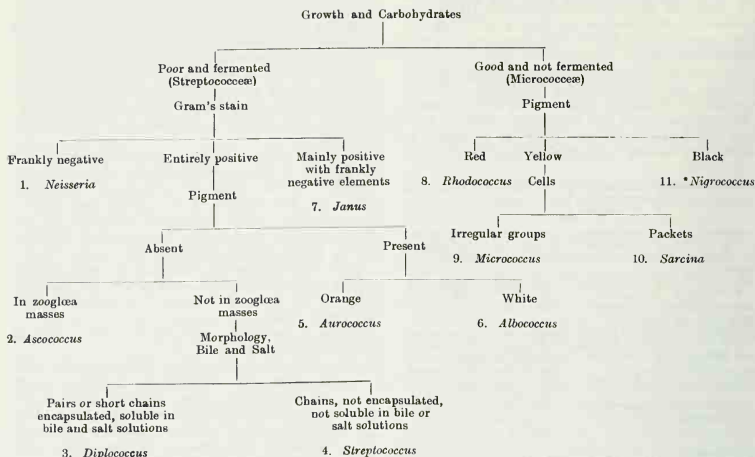
Janus crassus (von Lingelsheim 1906), synonym *Diplococcus crassus* von Lingelsheim 1906.—This is found in cerebrospinal meningitis and is characterized by not fermenting Mannitol and by producing acidity but no gas in Raffinose.

***Janus septicæmicus*,** new species.—This was found once in a case of septicæmia and was obtained in pure culture from the blood. It is characterized by producing acidity but no gas in Mannitol.

These species may be differentiated according to the following table:—



DIAGNOSTIC TABLE OF THE FAMILY COCCACEÆ ZOPF 1885.

* *Nigrococcus* Castellani and Chalmers 1919.

Summary.—During the last five years the necessity of bringing forward the position of Gram-positive Gram-negative streptococcal-like organisms has been increasingly borne home to us in order that they may receive further study.

To do this, we formulate a new coccal genus "*Janus*," and differentiate three so-called species.

Acknowledgment.—We desire to acknowledge gratefully the many kindnesses received from Colonel Aldo Castellani in the preparation of this short paper.

Khartoum,

January 1, 1919.

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Notes and News.

INFLUENZA.—There has been a recrudescence of influenza in and around London, and the type is different in several ways from that which prevailed two months ago. The lung affection seldom reaches the pneumonic stage, but remains bronchial only, and is of uncertain distribution, one lung only showing signs at a time. The smarting of the eyes during the first thirty-six hours is very troublesome, but no untoward consequences ensue. The temperature abates on the third day, but after twelve hours of subsidence the fever recurs and lasts for some four to six days. A distressing feature of the present recurrence is the delirium which comes on during the last day or two of the fever and continues after the feverishness has gone. The delirium is active with hallucinations of marked type accompanied by insomnia. The best drug to control the delirium and induce sleep is Hyosine in the usual dose for adults of gr. 1/100th. It is too early to ascertain what the subsequent history of the mental derangement will be, but so far as experience goes no permanent trouble is likely to be established.

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THE JOURNAL OF

Tropical Medicine and Hygiene

MARCH 15, 1919.

"FIRST-AID" IN TROPICAL AILMENTS.

THE suggestion made in a previous number of the Journal that the time had come to hold classes on prevention and first-aid in tropical ailments when no doctor was at hand has become a practical reality, and the course will commence in the fourth week of March, 1919.

On Wednesday, March 5, 1919, Sir James Cantlie called a meeting in the City of London of the

representatives of several of the leading banks and firms having branches in tropical countries, and proposed that a course of the kind mentioned above should be instituted. The proposal met with instant and unstinted support by the representatives of the banks and firms present. Amongst those present were:—

Dr. Andrew Balfour, C.B., C.M.G. (Director-in-Chief, Wellcome Bureau of Scientific Research, London, formerly Director of Wellcome Laboratories, Khartoum, Sudan); George Croll, Esq. (Messrs. Harrisons and Crosfield); George Dodwell, Esq. (Messrs. Dodwell and Co.), who was elected chairman of the meeting; Major-General W. H. Grey, C.B., C.M.G. (Messrs. F. and A. Swanzy); E. E. Harrison, Esq. (Secretary, College of Ambulance); Dr. William Hartigan (formerly of Hong-Kong); H. D. C. Jones, Esq. (Hong-Kong and Shanghai Banking Corporation); Robert Littlejohn (African Banking Corporation (retired), Treasurer, College of Ambulance); George Millar, Esq. (Chartered Bank of India, Australia, and China); D. W. Paterson, Esq. (Bank of British West Africa); J. D. Pattullo, Esq. (Raub Rubber Estates); E. T. Wardrop, Esq. (Colombo Commercial Company, Ceylon).

Letters of apology were received from Sir John Anderson (Messrs. Guthrie and Co.); Lord Selborne (Bank of British West Africa); T. H. Whitehead, Esq. (Chartered Bank of India, Australia, and China); Sir Edward Rossing (Anglo-Ceylon and General Estates Co.); Messrs. Lyall, Anderson and Co.; Messrs. McMeekin and Co.; C. A. Birtwistle, Esq. (Jürgen's Colonial Products); and others.

The following syllabus of instruction has been drawn up, and the teaching will be framed on the outlines therein indicated:—

TROPICAL AILMENTS AND THEIR PREVENTION.

"FIRST-AID" MEASURES UNTIL DOCTOR ARRIVES.

Condensed Syllabus of Lectures and Demonstrations.

(1) *Personal Hygiene*.—Physical fitness for life in Tropics. Equipment for voyage and after. Clothing. Food. Alcohol. Smoking. Baths and bathing. Exercise. Sport. Games. "Climate" and its effects. Change and leave.

(2) *Sanitation*.—Housing. Mosquito netting. Milk and water supply. Filters. Vegetables and their dangers. Fruit. Disposal of refuse. Latrines and closets. Drainage. Camp life.

(3) *Malaria*.—Cause. Mode of spread. Life of mosquito. Prevention of malaria. Quinine and how to use it. How to recognize a malarial attack. First-aid treatment for guidance of those in isolated districts.

(4) *Disorders of Digestive Organs*.—Indigestion. Diarrhoea. Dysentery. Cholera. Liver disorders. Causes. Modes of infection. Prevention. How to recognize these ailments. First-aid treatment in isolated districts.

(5) *Parasites* and the diseases they cause.—Animal and vegetable parasites as they affect man.

Prevention of infection by parasites. First-aid treatment of diseases caused by parasites.

(6) *Surgical Ailments*.—First-aid for bites, stings by animals and insects. Snake bites. Heat stroke and sunstroke. Prevention and treatment. Varicose veins. Skin affections. Boils. Dhoobie itch. Teeth: their preservation and decay. Eye affections: prevention and protection from sun glare.

Special Lecture to Women.—Including the care of children and the diseases they are liable to. Prevention and alleviation.

Demonstrations by lantern slides, diagrams and microscopic specimens are given at each lecture.

H. S. Wellcome, Esq., has generously thrown open his Museum of Tropical Diseases for the use of those attending these lectures.

The lectures are held on Mondays and Wednesdays at 4.30 p.m.

Students may join at any period of the course.

Special emergency courses are given to meet the requirements of those whose time is limited to a few days in London.

A certificate of attendance is given to those who attend not less than five out of the six lectures and demonstrations.

Fees by arrangement.

Communications to be addressed to the Principal or Secretary of the College of Ambulance.

The following have agreed to join the teaching staff:—

Dr. Andrew Balfour, C.M.G., C.B.; Sir James Cantlie, K.B.E., M.B., F.R.C.S.; Dr. Aldo Castellani, M.R.C.P.; E. Treacher Collins, Esq., F.R.C.S.; Dr. C. W. Daniels, F.R.C.P.; Dr. George C. Low, M.R.C.P.; Dr. J. J. M. H. Macleod, F.R.C.P.; Dr. L. Samson; Professor W. R. Simpson, C.M.G., F.R.C.P.

Sir Patrick Manson, G.C.M.G., LL.D., F.R.C.P., has consented to give the opening address, which is arranged to be held at 4.30 p.m. on Thursday, March 27. It is intended that the regular course will commence on Monday, March 30, 1919, at 4.30 p.m. at the college.

It will be observed that many of the better known ailments are not specified in the syllabus; they will, however, be included in the lecture headed Parasites. The reason for the seeming omission is a very practical one, suggested at the meeting by Dr. Andrew Balfour and General W. H. Grey; it is none other than that the rehearsal of the many maladies which belong to the rôle of tropical medicine is calculated to frighten candidates for appointments, including not only the public, but also nurses and even doctors intending to take up work and residence in the Tropics. When a man or woman has decided to take up work and residence in a tropical country, there is always some credulous and well-meaning friend who finds some literature describing the ailments and diseases, the death- and sick-rate of that particular place, and sends it to the intending traveller with advice upon the subject. If the man cannot be frightened the young wife will be

assailed, and the dangers to life set forth in harrowing terms.

There is a special lecture for women connected with the course—a most important feature and a very essential one. The hygiene of the house depends more upon the wife than the husband. The screening of the house, not merely the mosquito netting around the bed, should be the woman's duty, and would be were she made to understand the meaning of the recommendation. The management of children also of tender years is an education in itself, and can only be done by those who have brought up a family in a hot climate.

It will be noted that the course is open to both men and women for all lectures except the special lecture to women.

H.R.H. Princess Christian will preside at the opening ceremony.

The initiation and development of a "first-aid" course of the kind promises to be as important and useful as any ever held at the College of Ambulance, 3, Vere Street, London, W.1, where all information concerning the course can be obtained.

Perforation of Echinococcus Cyst (C. A. Bambaren, *Cronica Medica Lima*, April, 1918).—Three years after an operation for echinococcus cyst of the liver, the young woman returned with the same set of symptoms, and a second operation revealed a large echinococcus cyst. Each time the cyst had been treated with formaldehyde before its removal. The cyst the second time contained 2,500 c.c. of fluid. The second day after the last operation the dressings over the wound were found soiled with substances from the stomach, showing a post-operative perforation into the stomach. The cyst was tamponed firmly and nothing was allowed by the mouth for three or four days, after which smooth recovery followed. There had evidently been adhesions enough to prevent injury from the perforation into the stomach. The first cyst may have been multilocular, and the second one was probably a recurrence. Sixty-six cases of recurrence are known, 29 in the liver and 11 in the muscles; of 22 recurrences in 414 cases 18 were in the liver. Recurrence is reported in 22 of 414 cases, including 18 in the liver. The intervals ranged from one to eighteen years, but all but 10 were in the first three years.

Primary Echinococcus Cyst of the Uterus (A. Turenne, *Revista Medica del Uruguay*, March, 1918).—When excising a supposed myoma in the uterus of woman of 47, as the tumour was seized with forceps, it tore, and a flood of fluid startled the surgeon, as he feared he had overlooked pregnancy. There was nothing to be done then but remove the uterus by subtotal amputation. In Argentina echinococcus disease is common, but only one other case of a primary echinococcus affection of the uterus is known. In literature records of eight others have been published in England, Germany, Italy or Russia. In this case the cyst had probably been present during the woman's last pregnancy.

Original Communications.

CLINICAL AND PATHOLOGICAL NOTES ON A FATAL CASE OF BILHARZIA TREATED BY TARTAR EMETIC.

By Major R. G. ARCHIBALD, M.B., D.S.O., R.A.M.C.,
Pathologist, Wellcome Tropical Research Laboratories,

AND

Major ARTHUR INNES, R.A.M.C.(T.),
Attached to the Egyptian Army, Khartoum.

CONTENTS.—Preliminary—Clinical—Post Mortem
—Histopathological Examination—Remarks—Refer-
ences—Illustrations.

Preliminary.—Considerable interest is at present being evinced in the use of intravenous injections of tartar emetic for Leishmaniasis, Trypanosomiasis and other diseases, and recently Christopherson has adopted its use in the treatment of bilharziosis of the bladder and claims to have had successful results.

In the Army, bilharziosis of the bladder and intestine is a fruitful source of invaliding Egyptian soldiers, and it was therefore decided to give the drug a therapeutic trial in the treatment of these conditions.

Clinical.—The case under consideration was a strong Egyptian soldier, who was admitted to Khartoum Military Hospital in July, 1918, suffering from hæmaturia. Examination of the urine showed a heavy infection with terminal spined ova of bilharzia.

An initial purge was administered, and treatment commenced with intravenous injections of tartar emetic. One grain of the drug was dissolved in 2 c.c. sterile water, and immediately before use was mixed with an equal amount of sterile normal saline solution, and then injected with aseptic precautions into the most convenient vein in the arm or back of the hand.

The initial dose was $\frac{1}{2}$ gr., followed after a day's interval with 1 gr., and after a similar interval by $\frac{1}{2}$ gr. then 2 gr., and the latter amount, viz., 2 gr., was given every second day. After the first 2-gr. injections there was a little vomiting and a slight degree of phlebitis at the site of the inoculation, which passed off in a day without ill effects.

From this time onwards each injection was followed by considerable cough with frothy expectoration, which, however, regularly subsided after fifteen minutes.

After the seventh and eighth injection there was a slight rise of temperature. Subsequent injections were usually followed by a temperature never higher than 99.4° F.

The urine up to this time had not shown signs of improvement and still contained blood and terminal spined ova. No improvement occurred after a total of 25 gr. of tartar emetic had been given, and as the patient was still in an apparently good

state of health it was decided to continue the treatment till a total of 31 gr. had been given. When this quantity had been reached the urine still contained blood and numerous ova. The patient's case was then deliberated on, he was still somewhat anæmic although blood tonics had been continuously administered, his heart sounds were regular and good although not robust, the appetite was good and he did not appear to be ill, and as no improvement had taken place it was decided to continue the treatment.

After a total quantity of 33 gr. had been given the urine was examined again and proved to contain blood but no bilharzial ova.

Unfortunately an epidemic of influenza occurred in Khartoum about this period, and three days after it first appeared in the ward occupied by the patient, he acquired the disease. He had a severe cough without respiratory embarrassment, a temperature of 105° F., and a pulse of 120.

Although his temperature remained persistently high for the next two days he did not appear to be losing ground. Suddenly on the fourth day of the illness he developed signs of collapse with sighing respiration and air hunger. The pulse became feeble and rapid, and in spite of the usual cardiac stimulants he died within an hour of the onset of the collapse.

Post Mortem.—A post mortem was performed about twelve hours after death.

The body was that of a well-developed and robust Egyptian soldier.

Lungs.—The right and left lungs were somewhat congested, and on the surface there were small pneumonic patches not very sharply defined from the surrounding tissue. There were no signs of pleurisy or pleuritic fluid.

Heart.—There was no evidence of pericarditis. The heart was dilated and hypertrophied, and the myocardium a little paler in colour than normal. No valvular lesions were present.

Liver.—Weighed $3\frac{1}{2}$ lb., was of a pale yellow colour and bile stained.

Spleen.—Was enlarged with a thickened capsule and weighed 12 oz. On section was firm and congested and dark in colour, resembling a malarial spleen.

Kidneys.—Both kidneys were slightly enlarged. Their capsules stripped readily. The surface of each kidney was paler than normal, and on section showed a somewhat swollen cortex.

Ureters.—Both ureters were thickened, more especially in the lower third, the inner surface of which was slightly congested.

Bladder.—On opening the bladder it was apparent that the mucous surface of this viscus was extensively affected with the disease. The mucous membrane was considerably thickened and infiltrated, and showed raised pigmented brownish-yellow areas with comparatively little healthy-looking tissue (*vide fig. 1*).

This thickening and infiltration was particularly well marked near the base of the bladder, where

two sessile papillomata were "en evidence" (fig. 1), the thickened mucosa in this area showed small depressions where the surface epithelium had undergone necrosis.

Areas less affected showed the typical "sandy patches" described in the disease, as well as areas of hyperæmia.

Pancreas.—This showed no abnormalities.

Suprarenals.—These, apart from slight congestion, were normal.

Alimentary Canal.—Nothing of pathological interest was noted. A careful search was made through the portal venous system for evidence of adult bilharzia worms, but with negative results.

Histopathological Examination.—Sections of the lungs were prepared and suitably stained, and showed all the typical changes associated with a catarrhal or broncho-pneumonia.

Liver.—The liver cells were very granular and vacuolated, and in many the nuclei were indistinctly stained and had disappeared. In certain areas the liver cells had undergone necrosis. Some of the liver cells contained hæmosiderin granules, probably of malarial origin. Sections treated and stained by Marchi's method showed fatty degeneration of the liver cells (fig. 2).

Spleen.—Sections showed evidence of congestion with increased fibrous tissue formation and the presence of malarial pigment.

Heart.—In certain areas the muscle fibres were granular in appearance, possessing nuclei poor in staining properties, otherwise no other pathological changes were noted.

Kidneys.—Hæmatoxylin-eosin stained sections showed that the most striking changes were present in the cells lining the convoluted tubules. The nuclei of many of these cells had disappeared, and the cells had undergone granular changes with vacuolation, representing a condition of cloudy swelling. These changes were present to a less extent in the straight tubules. In sections stained by Marchi's method the fatty changes present consisting of fatty degeneration and fatty infiltration could be well seen (fig. 3).

Bladder.—Sections showed the presence of large numbers of bilharzial ova lying in the swollen and congested mucous membrane which in parts had undergone a molecular necrosis (fig. 4). The deeper parts of the mucosa were crowded with ova, leucocytes, plasma cells, giant cells and connective tissue cells, and in certain areas this inflammatory infiltration had extended to the submucosa.

Inferior Vena Cava.—As already mentioned, the iliac veins and inferior vena cava were carefully searched for the presence of adult worms but with negative results. A portion of the vena cava was removed for sectioning and treated and stained by Marchi's method. In the tunica intima, more especially in the deeper layers, large numbers of fat cells were present (fig. 5).

Remarks.—The case seems worthy of record even if considered in light of a warning to those who are using the drug tartar emetic on an extensive and

intensive scale in the treatment of Leishmaniasis, Trypanosomiasis and Bilharziosis.

The poisonous effects of antimony have been known for a long time, and the earliest recorded case of death from tartar emetic was that of an epileptic child in 1682 [2]. Crevin in 1568 wrote that "there is no poison which one might more secretly poison a man," but he cited no case.

Salkowski [3] in 1865 stated that the prolonged action of tartar emetic produced fatty degeneration of the liver, kidneys, heart and muscular tissue of the diaphragm, an observation which has been confirmed by others and more recently by Breinl and Priestley [5].

As a successful remedy, tartar emetic has been employed in Leishmaniasis and trypanosomiasis. Its value in kala-azar leaves little doubt but deaths have occurred in the treatment of this disease in India and the Sudan.

Knowles [4] in a recent paper records five deaths out of twenty cases of kala-azar treated by tartar emetic, and calls attention to the special care necessary in the use of the drug.

In the treatment of kala-azar by tartar emetic there is apparently a tendency to ignore the existence of the profound blood changes present, and to depend entirely on the drug to cure the disease by virtue of its specific action on the causal parasites.

As already mentioned, Christopherson has employed tartar emetic with success in the treatment of bilharziosis, and claims that the drug has a helminthoidal action on the adult worms.

Definite experimental proof as regards this point is still lacking, although his view receives some support from the single case cited in this paper.

If the drug possesses helminthoidal properties then it will be a matter of some difficulty to ascertain the quantity necessary to bring about such a result.

Presumably the eosinophilia noted in the blood in bilharzia is dependent on the presence of the adult worms; a determination therefore of the eosinophile ratio before and during treatment may offer some guide as to the vitality or otherwise of the worms.

In the case recorded in this paper there can be little doubt that the pathological changes in the organs were attributed to the action of tartar emetic, and were not sequelæ of bilharzia, influenza or a previous malarial infection.

The treatment carried out appeared intensive and ended in a sudden and unexpected fatal result.

Similar cases of sudden and unexpected death have occurred during the tartar emetic treatment of kala-azar. Such results may be due to fat embolism, a view suggested by the pathological changes present in the liver, kidney and inferior vena cava of the case of bilharzia described in this paper.

Khartoum,

February 1, 1919.



Fig. 1.

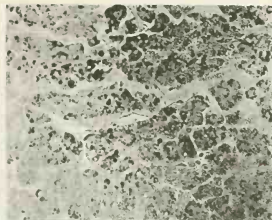


Fig. 2.



Fig. 3.

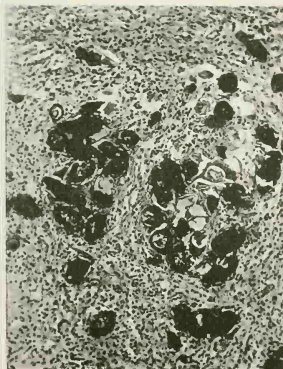


Fig. 4.

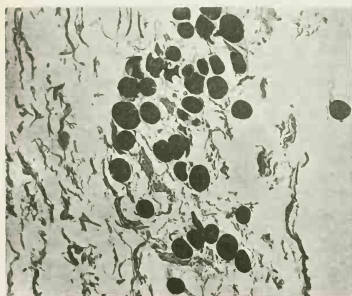


Fig. 5.

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ILLUSTRATIONS.

- FIG. 1.—Mucous surface of the bladder.
- FIG. 2.—Section of liver stained by Marchi's method. $\times 200$ diameters.
- FIG. 3.—Section of kidney stained by Marchi's method. $\times 200$ diameters.
- FIG. 4.—Section of bladder. $\times 95$ diameters.
- FIG. 5.—Section of Inferior Vena Cava stained by Marchi's method. $\times 200$ diameters.

THE RIGOR OF MALARIAL FEVER.

By MATHEW D. O'CONNELL, M.D.

In the initial stage of malarial fever a well-marked rigor is sometimes observed. It does not occur in all cases, and in many amounts to only a slight tremor or even a slight tension or stiffening of the voluntary or skeletal muscles, especially the dorsal muscles, accompanied by a sensation of chilliness such as is experienced by passing from a hot, or even warm, to a cold atmosphere. It is usually preceded by involuntary muscular movements, such as yawning or stretching of the limbs or stiffening of the dorsal muscles.

The rigor of fevers in general is said to be caused by the increased difference between the temperature of the body and that of the surrounding air produced by the rise of body temperature. In cool or cold climates, when the difference between the temperature of the body and that of the surrounding air is 28°C . (50°F .), or even more, it is conceivable that an increase of 2°C . (5°F .) in this difference, produced by the rise of body temperature, might cause a tremor or rigor. But in warm or hot climates where the difference between the temperature of the body and that of the surrounding air is only 15°C . (30°F .), or even less, an increase of 2°C . (5°F .) in this difference, produced by the rise of body temperature, would not explain the occurrence of a rigor in a malarial patient lying in a warm bed.

In ague, however, the rigor when it occurs is not attributed to the increased difference between the temperature of the body and that of the surrounding air, but is said to be caused by the sporulation of the parasite or by a toxin liberated into the blood plasma by such sporulation. No explanation is given as to how or why sporulation of parasites, or a toxin said to be liberated thereby, should cause a rigor such as occurs in ague.

It seems to me that there is a more reasonable

and a simpler explanation of the rigor or tremor or tension of the voluntary muscles in ague which, moreover, receives some degree of support from physiological experiment as well as from clinical observation. I refer to the increase of water which is found in the blood and tissue, including the voluntary muscular tissue of those who suffer from malaria, and which I have previously given reasons for believing is the result of exposure to the atmospheric conditions under which the disease becomes prevalent.

Malariaologists agree that there is such an increase of water in the blood and tissues in malaria. The low specific gravity of malarial blood indicates it. Liebermeister pointed it out, and Manson and others refer to it. In some it is slight, in others considerable, although in the living patient there may be little or nothing to indicate it beyond slight oedema of the ankles or of the lower eyelids. It is, then, this increase of water in the voluntary muscular tissue which I suggest causes the tremor or rigor of ague.

Physiologists have shown by experiment that voluntary muscular tissue as it absorbs water passes into a state of rigor. When one end of the sartorius muscle of a frog is immersed in normal saline solution it exhibits rhythmical contractions, and if the temperature of the solution is 40°C . (104°F .), that is, a temperature which the water in the voluntary muscles of a person suffering from a paroxysm of ague must often reach, the muscle passes into a state of rigor at once. This rigor of voluntary muscle, produced by the absorption of normal saline solution, is known to physiologists as *water-rigor*.

Again, in the treatment of the collapse stage of cholera or of severe hemorrhage by the transfusion of saline solution having a temperature of from 37°C . (99°F .) to 37°C . (100°F .), clinical observers have noticed that as the transfusion proceeds the body temperature rises and a rigor occurs. Thus Major Stafford Cox, M.D., who has treated over 2,000 cases of cholera by transfusion of saline solution, says that as the transfusion proceeds, at the rate of about 2 oz. per minute, the muscular cramps cease, the pulse is restored, body temperature rises, and when about five or six pints of the solution have been transfused a rigor invariably develops, the patient's teeth rattling like castanets, the body temperature then being about 37°C . (100°F .). This rigor is known to clinical observers as *transfusion-rigor*.

In the collapse stage of cholera a very large quantity of the water of the blood and tissues has been cast out of the body in the copious alvine discharges. So much so that the specific gravity of the blood is thereby often increased from 1,055 to 1,080. And it is when this loss of the fluid constituents of the blood has been a little more than replaced by the transfused solution that the rigor occurs. The rigor is considered by some an indication for stopping further transfusion.

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DAYLIGHT SAVING.

It would appear that daylight saving originated in England after a long advocacy by a Londoner, Mr. W. Willett, who had spent the better part of his life trying to convince his fellow citizens of the benefits of his novel idea. Called as usual a crank, as every

man with any new idea is, he lived to find his fad put down for consideration in the House of Commons, but he died just before it passed into law, and the regret of the nation that he did not live to see his life-long fight brought to a successful issue was sincere. When one comes to think of it, it gradually grows upon one that no similar piece of legislation was ever fostered and finished in triumph. That he was a town dweller goes without saying, for it is a measure which meets the requirements of town dwellers perhaps but is antagonistic to the wants of the countryman—the farmer and the farm servants and their work. It gives a longer evening for recreation, a time when out-of-door work can be done on the allotment and in the garden; when cricket, tennis, cycling and other games have a precious hour of daylight in which to continue, an extended period of time in which to give to open-air exercise in daylight. For the town dweller, the factory hand, the clerk in the office, and all concerned in indoor work, the change is beneficial to a degree and should be, if properly used, a great factor in the national health. Many countries in Europe have already adopted the system. France and her quick-witted people speedily put the idea into practice and the more slowly thinking Teuton adopted it later. The more Southern people became convinced in time of the benefits likely to ensue and put their clocks forwards or backwards in conjunction with the spring and the autumn equinox.

The other side of the question—namely, the countryman's—was never given a thought. He is at a discount in this age of big towns and factories, bank clerks and shopkeepers. Nature does not follow the ways of man nor adapt herself to the artificially made laws of man. The dew does not go off the clover at an earlier hour because man has changed the clock nor does the sun commence to dry the sheaves of wheat and oats that are waiting to be carried in the autumn, the time when the dew mostly prevails. It is a loss to the farmer of at least an hour's work a day and especially at the season of the year when the loss of an hour is precious beyond repair. We live in an artificial world in many ways to-day, when the laws of Nature are set at defiance in more ways than one and in none more so than by the particular interference we are now considering. It is a further confirmation of the fact that we are getting—that mankind is getting—farther and farther from Nature; that the town voter is now the master, and the land and the man who produces the food of the nation is not worth considering. Perish the farmer and all his old-fashioned ideas; we the town dwellers demand it; we have the mastery in parliaments, the members of which represent the cities and towns in numbers altogether outnumbering the mere agricultural representatives; and therefore we are entitled to legislate for our wants.

Such is the state of affairs in the Western world to-day, an artificial system, and one which would alter the rising and setting of the sun if such were possible.

Are there no drawbacks to the system in towns?

In summer, under natural conditions, it is difficult to get the children to go to sleep in daylight; it is now still more difficult with the longer hour added in the evenings. The answer to that is, they have an hour longer in the morning to sleep. But children are Nature's progeny, and to alter a child's customary hours suddenly is as difficult as to cause the dew to make off because the clock shows it should. Children are early wakers in accordance with all things in Nature, and the change suddenly brought in takes a long time to accustom a child to; the waking of the child in a small household means the early waking of the adults, and the parents who rejoiced at the longer daylight in the evening find themselves deprived of at least one hour's sleep thereby. These are looked upon as trivial matters, and the children must be taught better manners, and the objection is thus thrust aside. Perish the children, they have no vote and therefore no power; they are perishing fast enough in this artificial world of ours without this, the most flagrant of man's attempts to defy Nature.

The animals, moreover, know no law except those of Nature. The cock will crow at Nature's hour and not that devised by man. The cow will not "let down" her milk one minute earlier or later because the clock is changed; the later milking means missing the milk train in the morning, and the earlier evening milking finds a lessened quantity of milk because the cow has not yet got the full quantity in her udder. The town dweller says, "Oh, you can easily change that." He may as soon legislate that the east wind shall not blow.

What about the physiology of the change? The early morning hours are when the temperature of the body is at its lowest and therefore its energy is at its minimum. At 6 a.m. it begins to increase, and from thence onwards until 12 noon, when it reaches the normal 98'4". As the day advances, from morning until noon, the energy increases and the working power is at its maximum. But the artificial moon is now 1 p.m. and the maximum of energy is delayed in its attainment and the quality and quantity of the morning and forenoon work is poorer than formerly. There are pros and cons no doubt in this question, but the town dweller is the gainer, except in the case of young children, and the countryman the loser at almost every point.

The man who is accustomed to get up at four or five o'clock, as is the writer, loses; he has to use an artificial light through a long period at the beginning and the end of the "clock advanced" season until normal sunrise. The factory hand has to get up and go to work in the dark for a considerable period of the changed hours when he has to be at work at 6 a.m. This objection will be lessened as labour laws diminish the hours of work to a fractional period of the twenty-four hours, a condition of things which have never obtained in this world and will be revoked as mankind returns to sanity.

The application of this super-civilized state of things, this thwarting of national laws, is never likely to obtain in the tropics. In the Equatorial Zone the twelve hours when the sun is above the

horizon varies not from year's to year's end, so that little or nothing can be gained or lost. The usual time of waking is 5 a.m., so that when the sun is up the people are ready for work at 6 a.m., and the early 6 p.m. setting generally means that 9 p.m. is the hour of retiring. They abide by Nature's ruling with no question of changing their ways to Western European (civilized?) teaching. In the semi-tropical zone the question may arise, but it is unlikely to do so as the change would be scarcely necessary with the slight departure from the Equatorial time of sunrise and sunset.

The sum and substance of the argument ends in adaptation to the requirements of the locality, but even locally what suits the town folk does not suit the country folk and never will do so. The majority, however, dictate the laws, and in a land with a town population exceeding the rural population the legislation must prove detrimental.

J. C.

Annotation.

Spread and Incidence of Intestinal Protozoal Infection in the Population of Great Britain (J. R. Matthews and A. Malins Smith, *Annals of Tropical Medicine and Parasitology*, February, 1919).—Among four hundred and fifty civilians (men, women and children) in Liverpool Royal Infirmary, seven, or 1·5 per cent., were found by one examination per case to be carriers of *Entamoeba histolytica*. Among one thousand and ninety-eight healthy young recruits one examination revealed sixty-two, or 5·6 per cent., to be infected with *E. histolytica*.

The numerical differences between the results for the two groups are probably not significant. Whereas the young recruits form a selected section of the population, the infirmary cases constitute a very mixed population.

The non-pathogenic intestinal protozoa (*E. coli*, *E. nana*, *Giardia* and *Chilomastix*) are commonly distributed in the population of this country.

Stools were examined for intestinal protozoa from 548 children under 12 years of age. *E. histolytica* was found in 1·8 per cent., and the commonest protozoan was *G. intestinalis*, found in 14 per cent. Children became infected soon after they were one year old and from this age onward all the common intestinal protozoa were found, irrespective of age or sex.

The results have been compared with those from a similar population of adults and it has been observed that *G. intestinalis* in particular is much more common among children.

Investigation of whole families of which one member was known to be infected showed that in certain families infections were much more common than in the general population.

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Abstract.

THE SANITARY ASPECTS OF WARFARE IN SOUTH-EASTERN EUROPE.¹

By Professor W. J. R. SIMPSON, C.M.G., M.D.

THE EXCELLENCE OF THE MEDICAL AND SANITARY ARRANGEMENTS IN FRANCE.

THROUGHOUT the war the Western front has been distinguished for the wonderful success of its medical arrangements. In no former war have such brilliant results been attained in the surgical, medical, nursing, administrative, scientific and sanitary sections.

The splendid organization of the hospitals, the transport of the wounded and sick, and the remarkable results which have attended the treatment in hospital of the sick and wounded have secured the unqualified admiration of those who have studied them. Similarly the comparative freedom from epidemic disease owing to the sanitary administration has rendered the four years' war unique in the history of wars in France. Side by side with these there have been scientific investigations which have added much to our medical knowledge, among which may be mentioned the infections of wounds and their prevention and treatment, and the research into trench fever.

THE SANITARY PROBLEM MORE COMPLEX IN SOUTH-EASTERN EUROPE.

When we turn to the South-Eastern Front we find the same excellence in the British hospital and medical arrangements, although in an area far from England, with its corresponding difficulties of transport and supplies accentuated by the nature of the countries concerned. The campaign, however, is conducted in areas subject to great ranges of temperature between summer and winter, and where, owing to the domination of the Turk for over 500 years, the inhabitants live under more or less primitive conditions, without any special organization for or attention to the preservation of health.

Wars in this region have always been distinguished for much sickness and mortality, and it is because I think that information gathered from what has already happened may be useful in securing the adoption of more effective measures in these and in tropical countries, where the sanitary problems are much more complex than in France.

SOUTH-EASTERN EUROPE THE GATEWAY OF THE EAST AND WEST.

The South-Eastern corner of Europe has always been a great fighting arena. It is the gateway on land to the East and for the West, and as such its possession has been coveted in turn, and fought

for by the rulers of expanding empires on either side of it from the earliest times. The last of the great Powers in possession is the Turk. For the past 200 years Austria or Russia, alone or together, have attacked Turkey with the object of taking her place, and they have considerably reduced her hold. Now it is the ambition of Germany, in alliance with Austria, to become heir to the Turk.

Germany remembers that Alexander the Great with a well-trained army, and without railways or other modern means of transport, started from the Vardar Valley, defeated the Persians—the most powerful nation of that time—conquered Palestine and Egypt, destroyed the Persian imperial power at Arbela, and extended his conquests to Afghanistan and India. It was only war-weariness of the soldiers, after nine years of incessant warfare, that prevented him from adding India to the Macedonian empire.

Germany hopes, and she will not for a moment discard that hope, whether as an empire or a republic, that she will one day be in possession of the gateway, or so control it that she will be able with her Allies to attack the British Empire at a vulnerable spot and threaten our possessions in Africa and Asia. If she cannot retain the gateway in this present war by force, nor by diplomacy cheat the Allies, she will, unless great foresight be shown, endeavour to do it in times of peace by colonization and bide her time. It is not without purpose that the Serbian population has been largely exterminated and scattered. It makes it easier to colonize and to occupy by peaceful penetration.

SICKNESS AND MORTALITY IN THE EARLY WARS.

Although the chief interest necessarily centres in the sickness and mortality that have occurred in the war of to-day, yet some of the events in the more remote times are not without their lesson. For instance, it is germane to the subject to recall the fact that the immense army of Xerxes on its retreat through Thessaly and across the Vardar Plain, and that portion of the country now occupied by the British troops in the Struma Valley, suffered from hunger, dysentery and pestilence to such an extent that the greater part of it perished, and when the remnant reached Abydos the major portion died, though food and water were plentiful. In the accounts of the war between Austria and Turkey and between Russia and Turkey in the eighteenth and early part of the nineteenth century, the invariable story is one of much sickness and mortality from intermittent fevers, dysentery, typhus fever and plague, and from the effects of a bad commissariat. The infection of typhus and plague were not confined to the armies, but spread to the civil population, who, in their turn, infected the soldiers billeted in the villages and towns. It was largely owing to these frequent wars, with their movement of armies and refugees from place to place, that plague continued in South-Eastern

¹ Abstracted from the *Transactions of the Society of Tropical Medicine and Hygiene*, vol. xii, No. 1.

Europe for more than 100 years after it had disappeared from Western Europe. It at last disappeared from Turkey in the middle of the nineteenth century. The Crimean war had no plague, but there was the usual prevalence of intermittents, typhus fever, dysentery and scurvy in the armies, and in addition to these cholera. This disease had been brought to Gallipoli with the French troops from France, where it was epidemic. It exercised a considerable influence on the course of the campaign, being the cause of the French army having to retreat from the Dobrudja. The disease spread from the armies and caused great havoc among the civil population.

In the Russo-Turkish war of 1878-9 the Russians lost by death from typhoid, typhus and relapsing fever some 24,000 men out of an army of less than 400,000, while dysentery and intermittent fevers prevailed as usual. The Turkish troops suffered to a corresponding degree.

DISEASE AMONG THE SERBS IN THE BALKAN WARS OF 1912-15.

The three Balkan wars, beginning in 1912 have likewise maintained the bad reputation for unhealthiness which has always distinguished wars in this region.

In the first war in 1912 between the Balkan States and Turkey we heard in England much of the doings of the Bulgarians and Greeks against the Turks, but little of the important victories gained by the Serbs, who signally defeated the Turks at Koumanovo, in what is now considered the decisive battle of the campaign. The Serbs sent 30,000 of their men to Adrianople, and by their superior artillery materially assisted the Bulgarians to capture that city. They moreover defeated the Albanians and Turks, followed their retreating armies in the depth of winter through the mountains and inhospitable wilds of Albania, conquered that country, entering Scutari and Durazzo, and came into possession of all that region which formerly belonged to ancient Serbia. In doing so, this portion of the Serbian army came in contact with the typhus fever which is endemic in Albania, and brought the infection back with them and with their prisoners to Serbia, where for many years past it had been unknown.

The first Balkan war, however, was a short one, and there was little time for the appearance of the usual war pestilence to any great extent. There was, however, sufficient time for typhoid fever and dysentery to prevail, and there is also the outstanding fact that the prevalence of cholera among Turkish troops in the Chatalja lines and in Constantinople, together with the check to the Bulgarians inflicted by the Turks, helped in some degree to prevent that city falling into the hands of the Bulgars. Some 18,000 cases of cholera occurred in the Bulgarian troops, but energetic measures were taken by the Bulgars—under foreign direction—to prevent its extension.

The second Balkan war was also short. Bul-

garia, not content with the division of the spoils and hankering after Macedonia, suddenly, without warning, attacked the Serbs and Greeks. The war began on June 30 and ended in August with the defeat of the Bulgarians. Cholera, however, which had not affected the Serbs in the previous campaign, now attacked them, and in a short time 7,000 of their soldiers succumbed to this disease. There is an interesting history attached to this outbreak. Before the war a distinguished Austrian professor was consulted as to the value of inoculation against cholera, and his opinion was such that the Serbians did not feel justified in employing this prophylactic. Nevertheless, the Austrian army was inoculated against cholera, the professor having changed his opinion later.

It is interesting to note that in 1916 the tetra-vaccine prepared by Castellani, and consisting of typhoid, paratyphoid A, paratyphoid B, and cholera bacilli, was used by the American Red Cross on a large scale in Serbia and was officially adopted by the Serbian army, and is now used to this day with good results.

Before Serbia had time to recuperate after the Turkish and Bulgarian wars she was plunged into a third. The new arrangements in the Balkans interfered with Austrian and German plans of extension and control in the East. On July 28, 1914, Austria declared war against Serbia. Taken more or less by surprise, the Serbian army had to cede territory where invaded in order to prepare to meet so formidable a foe. The invasion was announced to be a punitive expedition, and under this name Austria inflicted cruelties and atrocities on the civil population which remained behind equal to if not worse than those of the Germans on the Belgians. The triumph, however, was short lived. The Austrians were badly defeated and driven out of Serbia with a loss of 20,000 prisoners.

In a second offensive the Austrians were again defeated and 4,000 prisoners taken. In a third invasion in November, 1914, the Austrian army succeeded in reaching Valjevo, but shortly afterwards the Serbs won a great victory over the Austrians, drove them out of the country a second time and captured some 70,000 prisoners and an immense quantity of booty. This was in December, 1914. This marvellous success over an army exceeding five army corps in strength was, however, followed by an event disastrous to the Serbs. When the Serbian army and the civilians who had fled from the invaded territory reoccupied the towns and villages which had been in the hands of the Austrians there sprang up an epidemic of typhus fever, which soon spread in every direction and attained an immense magnitude. The previous infection of typhus fever from Albania, which had created no alarm, was now heavily reinforced by a strong infection from the Austrian soldiers, who had brought it with them from their own country. The whole Serbian country became flooded with typhus, and although the epidemic was heroically dealt with, at least 150,000 of the Serbian soldiers and Austrian

prisoners were attacked, of whom not fewer than 30,000 died. Out of 350 Serbian doctors 126 succumbed to typhus fever, the death-rate being 36 per cent.

One of the military hospitals, which in peace time had only beds for 400 patients, receiving 1,600, of whom 1,000 were suffering from typhus fever, and in which, out of a staff of forty-two doctors, dispensers, auxiliary doctors, dressers, and nurses, only three escaped infection. It is impossible to estimate the number of the civilian population that was affected and died of the disease. The disease was recognized as typhus fever in December, 1914; it continued in full force through January, February, and March, of 1915; in April it died down and ceased in June. This epidemic, like all epidemics of typhus, was seasonal in character. The cessation in June is an interesting epidemiological fact. With typhus fever was associated an epidemic of relapsing fever, but these were not the only epidemics that had to be contended with. An epidemic of sand-fly fever is recorded as having occurred in August, followed in September by an epidemic of malaria, which Colonel Castellani describes as having a very protean character, a large number of cases being of the comatose type. He records also an epidemic at Geogheli in September, 1915, which was reported to be typhoid fever, but 90 per cent. of the cases of which, when investigated, turned out to be subtertian malaria of a typhoid type.

SICKNESS IN BRITISH ARMY IN GALLIPOLI.

While these events were happening in Serbia, disease was seriously affecting the British and French forces in Gallipoli. Of British troops alone, over 96,000 had to be removed from the peninsula from sickness in less than seven months, the great majority of these occurring in August and September.

The actual figures relating to casualties were stated in Parliament on December, 1915, as follows:—

<i>Dardanelles.</i>		
	Officers.	Men.
Killed ...	1,609	23,670
Wounded ...	2,969	72,220
Missing ...	337	12,114
	4,915	108,004
Sick (all ranks) ...		96,663

This number of sick did not include those who remained on the peninsula in spite of being ill.

It may be of interest here to note that the total number of sick in the Boer War for the 2½ years was 63,644. It has always been held that the sickness in the Boer War was abnormal.

SICKNESS AND MORTALITY DURING THE SERBIAN RETREAT.

At the time of the sickness at Gallipoli, the Russian armies, needing food and military supplies,

had been forced by Mackensen's victories to retreat from the Carpathians. This retreat exposed Serbia later to a fourth invasion of the Austrian army. The Serbs, weakened by the typhus epidemic and the previous campaigns, were in an ill condition to resist with any possibility of success an attack by the Austrians and Germans under the leadership of Mackensen on the one side, and by the Bulgarians, who had now joined the Central Powers, on the other. The Serbs, foreseeing that they would thus be attacked, had asked the Allies for 250,000 men; Venizelos was content if the Allies would send 150,000. In October, 1915, the Allies began to arrive, and mustered at first 22,000 and others quickly followed. They advanced to the rescue of the Serbs, who were putting up a stout resistance against overwhelming odds, but they were too few to pierce the wedge which the enemy had placed between the Allied and Serbian armies, and all prospect of a junction was destroyed. The Serbs had now the choice to surrender or retreat through Albania to join the Entente later. The latter choice was made, and then began that memorable and tragic retreat in which the Serbian armies left their country, marched through a hostile and mountainous country in the depth of winter, fighting against their enemies eager to cut them off or destroy them, until they reached the Adriatic, and were thence transported to Corfu. Before Corfu was reached the result of this retreat was the loss of over 100,000 men from hunger, exhaustion, disease and wounds. Less than 140,000 reached Corfu. Of these, even in this haven of rest, where every effort was made to bring them back to health, 10,000 died during the first two months from disease, typhus fever, relapsing fever and famine diarrhoea being the chief. After a period of recuperation in Corfu, a considerable Serbian army was able to join the Entente armies in Salonika.

DIFFICULTIES CONNECTED WITH THE SALONIKA CAMPAIGN.

The Balkans is a country of mountain ranges, deep valleys and fertile plains studded with lakes and marshes, and with rivers and streams that overflow their banks. The plains are separated by precipitous hills and mountains from which spurs stretch out in different directions forming subsidiary valleys; the passes between the plains are often narrow and at a considerable height; on the slopes of the hills and mountains watercourses abound, which bring down immense quantities of storm water from the higher ground, and which, meeting, form the tributaries of rivers or flow into the many lakes and marshes. The Struma river flows into the Thakinos Lake before it reaches the sea. Besides the river, marshes and lakes in the plains there are not infrequently springs coming to the surface, and they in their turn produce marshy ground; near the sea coast, in those parts where the hills or mountains are not far from the sea, springs, lakes and marshes abound. Macedonia is one of the most

malarious parts of Europe, the physical features lending themselves to the prevalence of malaria once the infection has been introduced and established. The country has few roads except those that have been made by the Allied forces. From Salonika there are three railways, one passes westward, crosses the great Vardar plain, which is little higher than sea level, and terminates at Monastir, which is over 2,000 feet above the sea level. Owing to the hills dominating this town being in the hands of the Bulgars, the terminus until lately was at Florina, the headquarters of the French command. A second railway goes north and follows the Vardar Valley, and the third also goes north until it reaches the Doiran Lake, then eastward to the Rupel Pass—which reminds one of the treachery of the Greek King—there it crosses the Struma river and turns south proceeding to Seres and thence to Drama—all well-known names in the fighting that has taken place in the British sector.

The road to Monastir by the Via Egnatia is more direct than the railway. It passes the Wells of Pella, the only remains except a small part of a thick and massive wall of the capital of Alexander the Great. The water is brought from the neighbouring mountains by aqueducts and conserved in large reservoirs. It is a dreary journey by the road, especially in winter, if the chilling Vardar wind is blowing, until one reaches Vertekop, which is sheltered and where two British hospitals are located. Both have been bombed by German aeroplanes, causing fatalities. The drainage work near to the hospital which was joined on to the larger works in the marshes in the plain completed by the French Anti-malarial Commission, had improved to a very great extent the health conditions of the hospitals.

From Vertekop there is at first a gradual and then rapid ascent to Vodena, a beautifully situated town in the hills, looking down on and commanding the Vardar plain. Water is so abundant that Vodena signifies a place of water. It was another of Alexander's residential towns. Higher up, the road passes by Ostrovo, where the Scottish Women's Hospital, overlooking the Ostrovo Lake, some 1,700 feet high, is situated, then past Kaimachalan on the right, a mountain nearly 10,000 feet high, which was stormed by the Serbs, and which, together with the taking of Gornachevo and Banitza and the range above it, forced the Bulgars to retire from Sorovich and Eksissu. These two towns in 1917 became centres for Russian, British, Serbian and French hospitals. With the capture of Monastir, the front very soon extended from Lake Ochrida and Prespa on the west front, along the range of mountains to Lake Doiran and to the Struma Valley, where the River Struma discharges into the sea on the east.

I spent some eight months in the Monastir district as Principal Medical Officer for the Serbian Relief Fund, whose activities embraced not only medical aid in hospitals and dispensaries established and maintained by the fund for Serbian soldiers and refugees who had fled from their homes, but

also the provision of comforts in the form of food and clothing. At the beginning of the year there was one small ambulance hospital at Lake Prespa, a larger one at Monastir, another at the Tchernabend, a dispensary at Kenali, another at Jevonia, and the principal hospital at Kremyan—at one time this was at Sorovich in Greek territory.

The chief towns in Macedonia are Salonika, Vodena, Soroviteb, Florina, and Monastir; the first and last possess very fine buildings, but in Salonika fleas, bugs, mosquitoes, and flies abound, as they do in the other towns. Colonel Balfour, in a lecture delivered at Salonika, gave an excellent description of these insect pests. Most of the inhabitants live in villages; some of these, such as Batachin, on the lower slopes of Kaimachalan, inhabited by shepherds, who keep their flocks and cattle away from the village, are clean and the houses well built, but in the majority of villages the inhabitants dwell in houses of a primitive construction, badly lighted and ventilated, and in which the fowls, pigs, and donkey occupy one end of the living room and the family the other. When the house is two-storied the family live upstairs and the animals below. It is under these conditions that there is every opportunity for the diseases of animals to be conveyed to man, and *vice versa*. There is one village which had been named many years ago the "Empire of the Fleas." Many of the patients admitted to hospital, sometimes suffering from malaria, sometimes with some other dangerous illness, were so abundantly covered with flea-rash that unless carefully examined the impression was given that they were typhus fever cases. The water supply in many places, especially in those near the foot of the hills, is good, owing to its origin from springs, but wherever there are wells they are polluted with filth; latrines, kitchen, and well are usually close together. There is much dysentery among the civil population, both bacillary and amebic, the former being the most prevalent; but the two diseases which bulk the largest are malaria and tuberculosis. Nearly every illness among the civil population was associated with one or both of these diseases. Among the refugees diseases of malnutrition were common. It was in a country of this description that military operations had to be carried on. Roads had to be made and fighting maintained while the Greek King with an army in Thessaly was intriguing and helping the enemy.

SICKNESS IN THE ALLIED ARMIES IN 1915 AND 1916.

Under the circumstances great caution had to be exercised. This meant delay, and delay in a malarious and insanitary country, where the troops undergo great fatigue and are unprotected, is dangerous. By the time Monastir was taken by the Serbs and French in November, 1916, and the British were fighting in the Struma Valley, the toll of sickness from malaria, sand-fly fever and dysentery had been enormous. The British troops

perhaps suffered in a less degree than the French except in the Struma Valley, where all the regiments were more or less affected, some worse than others. It is not surprising that the name which the Allied Armies received was the "Phantom-Armies." Let me give you one example. A regiment entered the Struma Valley 900 strong. In six weeks there were only 200 left not in hospital.

THE FRENCH ANTI-MALARIAL COMMISSION.

It was in 1916 that the Pasteur Institute recommended to the Government of France that two tropical experts should be sent out to study the malarial situation. This was agreed to, and the brothers Sergeant from the Pasteur Institute of Algeria were selected for the mission. As a result of their investigations they reported that it was essential that a Commission—not an advisory commission, but one endowed with executive powers acting under the Director of the Health Service of the Army of the East to secure the necessary support for its work—should be immediately sent to Macedonia to carry out anti-malarial measures. This Commission, of which Dr. Visbecq was chief, arrived in Salonika in March, 1917, and there was formed under his presidency an inter-allied Commission, with its headquarters in Salonika, to work out and put into practice the necessary measures in their respective spheres. As I had every opportunity of seeing the anti-malarial work that was done in the different parts of Macedonia during the year 1917, I have no hesitation in saying that the inter-allied Commission accomplished a great deal in a very short time, and that its services were of the highest value.

The other maps show the same in different parts of the country.

The practical work of the Commission proceeded, and consisted in distributing among the regiments and hospitals circulars and post-cards illustrative of the dangers to the soldier of the bites of mosquitoes, providing mosquito nets for bivouac tents and hospitals, issuing veils, carrying out large and small drainage works wherever marshes were close to camping grounds, filling up small excavations close to camps, and occasional oiling, but the latter had to be done sparingly owing to scarcity of oil. Quinine rations were also issued. In the Struma Valley similar measures were introduced. In this valley there was an additional precautionary measure taken, and this was that during the summer the greater part of the troops were withdrawn from the valley to the hills that overlooked it, only sufficient troops being maintained in the infected area to guard the outposts.

In regard to veils, I showed the Society last year one invented by my wife just before I started for Salonika, and which she calls the "Simpsonette." (It is described in vol. x, No. 7, June, 1917, of the *Transactions of the Society*.) She has greatly improved it. Hoods in future will be made non-inflammable with smokers. All the veils carried

about in one's pocket or fastened above the helmet are quite useless as a protection against mosquitoes at night; they are useful to keep off flies from the face during the day, but that is all. I now show the two kinds that have been found most useful. In future wars in a malarious country I believe the soldier will wear during the evening and night a mosquito headgear, just as he now wears in the Tropics during the day a sun helmet.

COMPARISON BETWEEN THE HEALTH CONDITIONS OF TROOPS IN FRANCE AND THOSE IN SOUTH-EASTERN EUROPE.

South-Eastern Europe is an unhealthy area for warlike operations, and that though disease has fallen very heavily on the armies of those countries who do not pay the same attention to hygiene as we do, yet in this war the Gallipoli and Salonika experiences demonstrate that the sanitary organization and measures which have been so effective in France have not been sufficient for armies operating in countries where malaria exists, and where sanitation is in a very primitive state. This state of affairs as regards the preventive side of disease in our armies as distinguished from the hospital and curative side, for which there cannot be but the highest praise, is emphasized also by what happened in Mesopotamia, East Africa, and Egypt. Our sanitary organization for campaigns in tropical and sub-tropical countries must be submitted to a thorough examination, and be reorganized on a very different basis from that which now exists. I gave expression to these views as early as June, 1915, but they were unfortunately disregarded. I repeated them in an article which appeared in the *JOURNAL OF TROPICAL MEDICINE AND HYGIENE* of December 1, 1916, on "The Need of an Organized Application of Tropical Hygiene to prevent Excessive Wastage from Disease in our Armies in the East," and it was followed later by a letter of mine in the *Times* on the same subject.

These views can be held without in any way diminishing the importance and magnitude of the work done by the British Sanitary Service in France. The results are written large in the health conditions of the army there, and everyone should realize and appreciate that success more. The conditions under which the armies are operating are different, so that what has been found adequate for the West is not so for the East, nor for the Tropics. In the West the armies are waging war—

(i) In a temperate climate.

(ii) The operations are near England and the base of supplies, whether it be food, equipment, ammunition, or other requirements for warfare.

(iii) France, except in regard to typhoid fever and dysentery, is a comparatively healthy country.

(iv) There was from the commencement a highly trained medical service for war and a small but well-trained sanitary service to deal with the hygiene of camps, the movement of troops and lines of communication, water supplies were protected and

ANTI-MOSQUITO AND FLY PROTECTIVE HEADGEAR (*Patented*)

Invented by Mrs. Mary Simpson.

No. 1.

(v) The troops were inoculated against typhoid fever and vaccinated against small-pox.

(vi) The only trouble was trench fever, the causes of which were not understood, but in consequence



Worn under the Helmet.



Worn above the Helmet.



Front Veil thrown back, acting as a protection for the neck.

treated, arrangements were made to give the soldiers baths and disinfect their clothing and blankets to free them from vermin, &c., while the beginnings of infectious diseases that might appear were promptly checked.

of the researches carried out in France and by the investigations in this country, under the direction of our President, Sir David Bruce, the methods of dissemination of this disease have now been made clear. It is hoped, therefore, that a systematic and organized effort will be made to apply this know-



Worn lying down or asleep.

ledge. Without this application the knowledge gained by the investigation is of no practical value.

(vii) The sanitary organization for the troops in France is such as to have attained remarkable success, considering the conditions under which it had to work.

In the East, on the other hand, in Macedonia for instance—

(i) The climate is extremely cold for a short time in the winter and semi-tropical for many months in the year.

(ii) The operations are a great distance from England and France and the base of supplies.

(iii) Supplies of all kind are very difficult to obtain owing to submarine attacks.

(iv) The area in which the troops are engaged is very insanitary and extremely malarious; the water supplies are polluted, and there is an abundance of fleas, bugs, lice, flies and mosquitoes.

(v) The armies have suffered from much sickness and mortality, causing a serious loss of effective strength, a great strain on hospital staff, and the need of a multiplication of hospitals, with their attendant expenses, which otherwise could have been avoided.

(vi) This condition of affairs demonstrates that the sanitary organization for the army is not effective where operating in a notoriously insanitary country, while the experience in Egypt, Mesopotamia and Palestine also demonstrates that it is not sufficient to preserve an army in a state of health in a tropical climate.

(vii) The International Anti-malarial Commission has done and is doing splendid work to mitigate some of these conditions, but as it began work eighteen months after the Allied troops landed, it did not prevent disease in the early and important stages of the campaign.

The arrival of an Anti-malarial Commission eighteen months after operations begin, may be advocated on the plea that it is never too late to mend. But certainly, from a preventive point of view, the sanitary officers and staff should arrive if not before, then at the latest with the first staff officers.

The dispatch of this Commission, which was an executive Commission, at least is an acknowledge-

ment that a special working staff to combat malaria was required.

SUGGESTIONS FOR REORGANIZATION OF THE SANITARY SERVICES OF THE ARMY FOR UNHEALTHY COUNTRIES AND TROPICAL REGIONS.

It is necessary that the whole attitude towards preventive medicine should undergo a change. To

No. II.



Worn above the Helmet.



Worn under the Helmet.



Smoker tube is used for drinking water or tea through glass tube.



Worn lying down or asleep.

wait until disease and epidemics occur is not prevention, however strenuous the efforts afterward to suppress them may be.

It is merely adopting the same system for a town or district, or regiment or division, as is employed when an individual falls ill. The doctor is called in, and in both cases the method is curative. It is certainly not preventive.

There are certain changes and additions needed to secure more efficient prevention of disease in armies that are destined to fight in tropical and sub-tropical regions and in unhealthy and malarious countries. First of all the position given to the sanitary officer, or to the sanitary service. As rank is equivalent to power in the army, the sanitary officer of the army should be given a higher position, and under the Director-General should be a distinct branch endowed with more executive power.

With a national army—

(1) The Director-General should be on the Army Council. In this capacity he would be the Minister

of Health for the Army. As a member of the Army Council he would be at once in possession of all the plans that are likely to be formulated, and be in a position immediately to arrange his medical and sanitary services accordingly.

(2) There should be two branches under him: the medical with its different sections, and the sanitary with its sections. The chief of each branch should have the rank of a major-general. They can always be in close touch with each other in matters which are in common.

(3) Each of them should have their Advisory Boards, and on them specialists in their respective departments. A Tropical Sanitary Board is needed to co-ordinate sanitary measures, to recommend supplies, to recommend suitable sanitary officers for the East, and to perform duties in sanitation similar to those of a general staff, in its preparation of plans for prevention and watching the progress of sickness and epidemic diseases with a view to their prevention. The plans should be prepared in times of peace, and, like the plans of the military staff, should be ready at the first indication of war to be put into operation. Tropical sanitation includes something more than sanitation in cool climates. In order, however, not to multiply boards, the two representatives of sanitation who were on the Army Medical Advisory Board should be transferred to join the Tropical Sanitation Board.

(4) There should be Inspector-Generals of Sanitation for each Army Corps as Consultant Sanitary Officers, and advisers to the generals and the administrative and executive sanitary officers, and to report on the efficiency or otherwise of the measures employed. They should proceed to the seat of war at the same time as the General Staff, and be in close touch with the Headquarters Administrative and Executive Sanitary Officers.

As regards the higher local administrative and executive sanitary officers, they should be quite distinct from the medical branch. True, much has been and can be done by preventive inoculations against bacterial diseases, such as cholera, the enterics, pneumonia, &c., but the insect-borne diseases need measures of a different order, requiring a very careful and systematic organization, all kinds of equipment, and a labour organization; so does the water supply, which is not always rendered safe in semi-tropical and tropical regions by chlorinization. The food and vegetable supply also needs careful attention. The duties of these administrative and executive sanitary officers involve so much detail and attention to sanitary supplies, equipment, sanitary works, to inspections, consultations and provision of labour, staff and material, that they can never be effectually carried out if combined with other duties. Close touch is necessary, not only with the Statistical, Intelligence, and Bacteriological Departments, but also with the Labour and Engineering Departments, and the Sanitary Department should have depots of their own for the ordinary materials they require.

In addition to the ordinary regimental sanitation

there needs to be an organization for the larger works connected with brigades or divisions, for camps and lines of communication, and for this sanitary officers of rank are required. There is no use sending a captain or a major to a general, and if recommendations are sent through a higher medical officer, possibly not interested in sanitation, they may miscarry.

General sanitation of the district should be quite separate from the duties relating to field ambulance hospitals.

Details which purposely have not been dealt with are left to those who have personal experience of warfare in the Near East and in the more tropical regions. We possess the knowledge, but we have not the organization to apply that knowledge in a manner that will safeguard our armies in the East from preventable disease.

CONTRIBUTION TO THE ETIOLOGY OF YELLOW FEVER.¹

By H. NOGUCHI, M.D.

In six out of twenty-seven cases studied, the injection into guinea-pigs of the blood of yellow fever patients produced symptoms and lesions resembling those found in men.

Dark field examination of the blood, liver, and kidneys of these inoculated animals revealed the presence of an organism whose morphologic characters closely resembled those of the organism (Weil's disease) previously described in cases of infectious jaundice.

The organism found in the blood, liver and kidneys of animals inoculated with the blood of yellow fever patients has been obtained in pure culture.

In some instances the direct dark field examination of the blood and liver of yellow fever patients showed the presence of a leptospira indistinguishable from that described as occurring in the blood and viscera of the experimentally infected guinea-pigs. Pure cultures of this organism were obtained directly from the blood of yellow fever patients in a limited number of cases.

By the inoculation of the blood and emulsions of the liver and kidneys of infected guinea-pigs, the infective agent has been conveyed from animal to animal without loss of virulence through successive series (now numbering eighteen); and pure cultures of the organism are obtainable during the course of the infection from any animal of these series.

When cultures of the organism, derived either from the inoculated animals or directly from the blood of a yellow fever patient, were inoculated into guinea-pigs, monkeys (marmosets) and puppies, symptoms and lesions were induced which were similar to those outlined as occurring from a successful inoculation of guinea-pigs directly with blood from yellow fever patients. The organism recovered in pure culture from these inoculated animals has retained its original characteristics.

Many of the guinea-pigs that did not succumb to the inoculation with the blood from yellow fever patients showed definite febrile reaction, some with a trace of jaundice, for several days, but soon returned to normal. Most of these guinea-pigs later proved resistant to infection with virulent organ emulsions or with cultures of the organism; while control animals (normal guinea-pigs or those inoculated previously with blood of patients suffering from other diseases than yellow fever) died, with characteristic symptoms and lesions.

A positive Pfeiffer phenomenon was obtained in the majority of instances with serum derived from convalescents from yellow fever in Guayaquil when tested with the organism (*Leptospira*) isolated from the yellow fever cases or from infected animals. This was also true of the serum of animals that survived experimental infection.

Characteristic symptoms and lesions were induced in susceptible animals by inoculation with the filtrates obtained by passage through Berkefeld filters V and N of the blood of experimentally infected animals, and the emulsions of the liver and kidney of these animals and of the cultures of the organism. *Leptospira* was demonstrated in the blood or visceral organs of the animals thus inoculated.

Report.

HONG-KONG.

REPORT ON THE INVESTIGATIONS OF THE OUTBREAK OF EPIDEMIC MENINGITIS IN HONG-KONG BY FIRST LIEUTENANT PETER K. OLITSKY, M.R.C., U.S.A., OF THE ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH, NEW YORK.

Laid before the Legislative Council by Command of His Excellency the Officer administering the Government, October 17, 1918.

(Concluded from p. 44.)

(2) *Non-contact Carriers*.—As no opportunity presented itself to continue the study of contact carriers, my attention was paid to a class of work which may only be regarded nominally as non-contact carriers. In the event of an epidemic of such great extent as this one, a class can hardly be chosen as a representative non-contact group. It was finally decided that the Victoria Gaol, in which no cases have developed throughout the epidemic and having a daily average of six hundred inmates, would offer a suitable source for determination of the number of healthy carriers. The prisoners are, in the main previous residents of Hong-Kong, and the length of confinement varies from a few days to several years.

In interpreting the results these factors must be considered. The prisoners are kept isolated in individual cells; there is no overcrowding; sickness is promptly attended to. In other words, the

¹ Abstracted from the *Journ. Amer. Med. Assoc.*, January 13, 1919.

sanitary conditions in the prison are better than in a great part of the Chinese community.

Most of the inmates showing positive cultures have been confined up to three months. The epidemic was five months in its course when the cultures were taken. The three inmates who carried the same type of meningococci which prevails in the epidemic entered the gaol, eleven days, twenty-nine days, and thirty-six days previous to the culture. In other words, it appears that the old prisoners were less apt to be infected than the younger (with regard to the time of confinement).

Finally, in several instances more than one colony of the same plate culture was examined for type. The results confirm the already established fact that usually all the meningococci in the same nasopharynx are of the same type.

EPIDEMIOLOGICAL CONCLUSIONS.

The Pre-epidemic Factors.—Sporadic cases of meningitis have occurred. Carriers of meningococci have also been found in the gaol population in some who have been inmates for over a year. On the other hand, the port is a great commercial centre and a carrier or a patient may have been "imported." In other event, the source of infection may have been a healthy carrier or a patient, native or foreign.

An excessively dry but extremely cold winter prevailed. At the same time there was an extraordinary number of cases of pharyngitis and bronchial affections and influenza.

These are favourable conditions in view of previous experience for development of cases of epidemic meningitis. In addition to overcrowding, these factors do not explain the great spread of the disease throughout the colony.

CONCLUSIONS.

(1) The local production of potent anti-meningococci serum and the systematic specific treatment of patients will serve to allay the distress of an appalling mortality during an epidemic.

(2) In four of ten moribund patients the meningococcus was found in the blood. This emphasizes the need of intravenous combined with the intraspinal methods of treatment.

(3) A more extensive use of the diagnostic methods, especially in relation to the cerebrospinal fluid, will aid in the detection of mild or missed cases.

(4) The Victoria Gaol, where the prisoners are kept isolated from each other, has shown an incidence of 24.61 per cent. of carriers, but no cases of epidemic meningitis.

(5) This and other facts stated above have led to the conclusion that the dense overcrowding of the population, rather than the actual number of healthy carriers of various types of meningococci, is the cause of the great spread of the epidemic.

(6) With regard to prevention, the important measures have been shown to be: (a) The education of the Chinese in order to effect an active co-

operation with the health and sanitary authorities; (b) the prevention of overcrowding; (c) the prevention of droplet infection, the infections of the nose and throat, by the instruction of the principles of personal hygiene and, under the conditions indicated above, the employment of masks; (d) the detection and treatment of contact carriers, including the isolation of those carriers who harbour numerous meningococci (especially of the same type which is present in the patient); (e) the isolation of the patients, including the mild and ambulatory types; (f) the discharge of patients and carriers after three examinations at five-day intervals show the absence of meningococci; (g) although still in an experimental stage, the use of preventive inoculations of anti-meningococci vaccine.

Reviews.

MALARIA AND ITS TREATMENT IN THE LINE AND AT THE BASE. By Capt. A. Cecil Alport. Pp. 279 + vii. London: John Bale, Sons and Danielsson. Price 21s. net.

This most comprehensive work deals with malaria in all its phases from the most acute to the chronic. The author begins with the consideration of malarial fever and its prophylaxis, next describes the clinical features of acute malaria, treatment generally then of cerebral malaria, pernicious malaria, cardiac symptoms, and collapse; the treatment of chronic malaria. Chapters are devoted to malarial anaemia, to pernicious anaemia, and malarial cachexia, to blackwater fever, to post-malarial nervous manifestations, to concurrent diseases, and differential diagnosis, malaria and appendicitis.

The previous experience of the author during ten years in South Africa has enabled him to profit from the material furnished by Salonika and Macedonia.

In South Africa an extensive general knowledge was obtained of antimalarial work and of all phases of malaria, both in natives inured to the diseases and in Europeans, both recent arrivals as well as old residents.

In Macedonia, though there the disease occurred in natives, the main problems were met with in newcomers of all nationalities who had come to a veritable hot-bed of the disease. Under such circumstances medical officers contributed all possible forms of previous experience and knowledge of not only malaria in all forms, their diagnosis and treatment, but also of all disease with which it can be combined or mistaken. Such a combination of knowledge was able to contribute all information obtained from all known methods of treatment, both treatment of the disease itself, but of all known possible permutations and combinations.

The book contains not only main principles but also minute details that are so important in the management of such a protean disease as malaria, especially now when at any moment either chronic and acute cases may be met with in the most

unlikely locality, to puzzle not only those inexperienced in tropical work but the most experienced.

The author has availed himself of his opportunities, of his own failures and successes, as well as of those of others.

The publishers are to be congratulated on a perfectly got-up book of handy readable size, with an excellent index, with unrivalled illustrations and coloured plates.

THE SCIENCE AND ART OF DEEP BREATHING AS A PROPHYLACTIC AND THERAPEUTIC AGENT IN CONSUMPTION. By S. Otabe, M.B.Tokio, M.D. Bale. London: John Bale, Sons and Daniels-son. Pp. 114 + vii. Price 5s. net.

Though the writings and works of Noguchi, Shiga, Kitasato, and many other Japanese are known to all students of medicine and science, this is the first book written in English by a Japanese doctor.

Written, too, in a London workhouse infirmary on the prophylaxis and cure of consumption, of which much is seen in all forms and stages, of which so much has to be learnt, both by the profession and the public, that the book is doubly welcome, combining the science of the West with the experience of the East. As Japan occupies a foremost position in practical life and science, there is an obligatory duty on everyone, lay as well as professional, to inform themselves on what has been useful in Japan for the prevention and cure of disease, for the maintenance and promotion of health. Deep breathing has been known to residents and students in the East, in Japan, China, and India for many years, yet much less known to the laity than the massage practised in the Middle East. The reason is easily understood; deep breathing is what people have to do themselves for themselves, while massage is done for them by someone else.

Another reason why deep breathing of the East is little appreciated in Europe is because it has been looked at askance because associated with religion, as an Eastern religious custom. The chapter on the effect of deep breathing on the mind is as interesting as instructive, as indeed is the whole book to both laymen and doctors, in particular to those desiring information on Eastern customs.

Correspondence.

To the Editor of the JOURNAL OF TROPICAL MEDICINE AND HYGIENE.

SIR,—With reference to your article on "Public Health in Egypt" in the number of the JOURNAL OF TROPICAL MEDICINE AND HYGIENE for February 15, 1919, may I be permitted to point out:—

(1) That though the Commission have the satisfaction of knowing that some of their recommendations are being carried out, there is as yet no assurance that these recommendations will be

adopted in their entirety, and therefore I think it is better that no definite statement on this subject should be made at the present time, and that the concluding remark of your article, "What Egypt has done England should do," is scarcely appropriate.

(2) You state that the Kasr-el-Aini School of Medicine at Cairo is the only school that has a department for teaching tropical diseases of children. This is not the case. As a matter of fact, the Commission pressed strongly for the institution of a course of instruction in diseases of children, a course which is very much needed, as is provision for the better dispensary treatment both of women and children.—I am, Sir, yours faithfully,

ANDREW BALFOUR,
Temp. Lieut.-Col., R.A.M.C.,
Late President, Egyptian Public Health Commission.

Notes and News.

THE news of the death of Professor Blanchard, of Paris, will come as a great shock to the scientific world. No name in Europe was better known than his, and no man more respected for his scientific attainments, for his geniality, and for the cordial welcome he extended to all visitors to Paris who were engaged in scientific pursuits.

At the last meeting of the International Medical Congress in London, Professor Blanchard, in the section of Tropical Medicine, presented Sir Patrick Manson, G.C.M.G., with an address from the medical men of the tropical world, setting forth Sir Patrick's attainments and stating what he had done in tropical medicine. The fact that Professor Blanchard was selected to convey this address showed the position he held in the world of science. We hope in a future edition to set forth the work of this great man more fully.

Studies in the Treatment of Malaria (J. W. W. Stephens and others, *Annals of Tropical Medicine and Parasitology*, February, 1919).—A comparison of the value of continuous and interrupted quinine administration in simple tertian malaria. Given a total weekly dose of quinine, it is better as a palliative to divide it into two equal parts and administer one on each of two consecutive days, than to divide it into six equal parts and administer one on each of six consecutive days; in other words, as a palliative, interrupted is preferable to continuous quinine treatment in simple tertian malaria. Colossal manganese by intramuscular injections in doses of 1 c.c. on each of two consecutive days in fourteen cases and 1 c.c. on each of three consecutive days in one case is of no value in simple tertian malaria.

Original Communication.

AMOEBIIC ABSCESS OF THE BRAIN: WITH NOTES ON A CASE FOLLOWING AMOEBIIC ABSCESS OF THE LIVER.

By Captain F. L. ARMITAGE, N.Z.M.C.

(A Report to the Medical Research Committee.)

IN the *Lancet* of July 1, 1918, a paper entitled "A Case of Amoebic Abscess of the Liver and Brain with no Previous History of Dysentery," was published by Major Stout and Major Fenwick, of the N.Z.M.C.¹

I had the opportunity of observing the course of the case and of making the laboratory examinations, and as I could find little or nothing on the subject in English medical literature I have ventured in the following paper to give further details of the case and an account of the condition based on this and all previously recorded cases.

The most important work on the subject hitherto published is that of Legrand of Alexandria, who gave the first complete account of the condition together with a list of all the previously recorded cases in his paper "Les Abscès dysentériques du cerveau," (*Archives Provinciales de Chirurgie*," vol. xxi, 1912, pp. 1, 75, 212, 625). This contains a complete bibliography up to the date of publication, with analyses in detail of the previously recorded findings.

Other noteworthy papers on the subject are:—

C. Morehead.—"Clinical Researches on Diseases in India," 1898. (First recorded case.)

Kartulis.—"Gehirnabszesse nach dysenterischen Leberabszessen." *Centralbl. f. Bakt.*, xxvii, 1904, p. 527. (First demonstration of amoeba in abscess.)

The following three cases have been recorded since Legrand's compilation appeared:—

Legrand.—(1913) *Bull. et Mém. Soc. Chirurg.*, Paris, xxvi, p. 1435.

Philips.—(1913) *St. Bartholomew's Hosp. Journ.*, xx, p. 158.

Sitsen.—(1913) *Geneesk. Tijdschr. v. Nederl.-Indië*, liii, p. 700.

There are also very brief general accounts of the condition in the following works:—

L. P. Phillips.—"Amoebiasis and the Dysenteries" (Lewis, London, 1915.)

Kartulis.—Article "Die Amöbendysenterie" in *Kolle und Wassermann's "Handbuch der Pathogenen Mikroorganismen,"* vol. vii, 1913.

The following is a typical history of a case:—

The patient is usually a young man or a man in the prime of life, who has had dysentery, either acute or mild, but usually chronic with relapses. He develops suppurative hepatitis. One or more liver abscesses may have been opened and satisfactorily drained. The condition appears to be improving for a time, but one day the patient is not so well, and complains of a severe headache which nothing will relieve; or the onset may be more sudden, almost dramatic, and the patient may without warning develop one or several epileptiform attacks. Strabismus, diplopia, aphasia, paresis, or hemiplegia, may occur. Coma supervenes, followed by death. The whole duration from the appearance of the first symptom varies from a few days to ten or fifteen at the most.

At the autopsy, the liver is found cicatrized, the abscesses may be healed or nearly so, but on opening the cranial cavity one or more abscesses are found in the cerebral substance, containing pus resembling that from the liver abscess.

In some cases the symptoms of dysentery have been absent,

and hepatitis has developed so insidiously that the liver abscess as well as the brain abscess is discovered only at the autopsy.

Cases have been recorded where cerebral abscesses have been absolutely latent during life, being situated in a silent area of the brain.

In all these cases the history, clinical features and anatomical findings may show variations, but they can be classified into one group as has been done since the condition was first recognized by Morehead of the Anglo-Indian School as a specific dysenteric infection.

Formerly dysentery was considered a distinct morbid entity limited to the intestine, but, thanks to the progress of microscopic anatomy, together with the study of protozoa and bacteria, we have definitely separated amoebic infection from other dysenteric syndromes, especially from bacillary dysentery.

This paper deals only with the cerebral complications of amoebic dysentery, but the observations of the earlier authorities prior to the discovery of the pathogenic rôle of the amoeba are utilized.

In the early cases it is difficult to say whether the condition dealt with was amoebic or bacillary dysentery, and some authors have even gone so far as to exclude entirely these early cases where the distinction was not made.

If this is done, only 9 irrefutable cases remain (10 including the case now recorded) where the amoeba was positively demonstrated; but as the amoeba may not have been found even in cases of true amoebic dysentery, it is legitimate to retain a considerable number of those cases where the clinical symptoms, etiology, and especially the pathological anatomy, support the view of an amoebic origin of the condition.

Terminology.—It is usual to speak of this condition as abscess of the brain occurring in the course of or following on liver abscess.

The term "Amoebic Abscess of the Brain" is adopted from analogy with amoebic abscess of the liver, which is an expression accepted by all authorities.

The adjective *tropical* has been discarded as these cases may occur in European and temperate countries. Two cases of cerebral abscess of this type following dysentery, but without liver abscess, show that intestinal amoebiasis alone is the cause of the condition without the liver acting as an intermediary.

It is perhaps advisable to mention here that these so-called cerebral abscesses, as well as amoebic liver abscesses, are not, strictly speaking, abscesses at all; and that the contents of these cavities are not really pus, at any rate at the beginning of their development. In reality, amoebiasis produces, in the brain, foci of necrotic disintegration of the nervous tissues or neurolysis, and in the liver foci of hepatolysis. Secondly, but not always, these necrotic foci may be transformed by bacteria into true pus.

Etiology.—Dysenteric abscesses of the brain supervene as a general rule during or following a liver abscess, and the condition is found most commonly in those regions where amoebic dysentery is endemic.

Of the 48 cases recorded to date:—

1 came from Madagascar.

1 " " Gulf of Mexico.

5 " " British India.

7 " " French Indo-China.

¹ Abstracted in the JOURNAL OF TROPICAL MEDICINE AND HYGIENE, vol. xxi, p. 137.

² This case is already quoted in Legrand's series in the *Archives Provinciales de Chirurgie*. Its number there is Observation 38.

24 came from Egypt.

1 " " Dutch Indies.

2 " " Tropical districts not precisely indicated.

2 occurred in France.

1 " " Germany.

3 " " England.

Age.—The age of the majority of the cases in the list was between 20 and 40. Two were above—45 and 47 respectively—and two were below, a girl of 5 and a youth of 14.

Sex.—Three only were females. This is not surprising, cases of amoebic liver abscess being exceedingly rare in women.

Occupation.—Sixteen cases occurred in soldiers; the majority of the other cases occurred in manual workers in hot climates who partook freely of alcohol.

Race.—The majority of the cases were Europeans but in Egypt cases occur amongst the Arabs and Copts.

Kartulis and Jacob consider that these cases are more frequent than is generally thought to be the case, giving the proportion as 3 per cent. of all cases of liver abscess. In my opinion these observers have been influenced by exceptional figures. Thus Kartulis saw 11 cases in a few years among 384 cases of abscess of the liver. Jacob found 2 out of 36 cases of hepatitis in two years. On the other hand Zancarel (of Alexandria) found only 4 cases in a list of 600 liver abscesses, and Valassopoulou was astonished at being able to add one to this series soon after publication. Wildt (of Cairo) saw only 1 case in 200 cases of hepatitis submitted to operation. M. Ruffer in a pilgrim camp at Djebel Tor, where cases of dysentery and liver abscess are numerous, saw none. Legrand after a case at Suez did not see another for fifteen years, although he operated during this time on about 200 cases of liver abscess. Then in 1905 and 1906 there occurred 3 cases, 2 of which occurred in one month. M. Couteaud, naval surgeon, saw only 1 case in thirty-eight years of practice, and was able to collect only 2 more cases in the archives of the Colonial and Military Hospital at Cherbourg.

The statistics of the American Commission to the Philippines did not record a single case in over 3,000 cases of liver abscess, and it is astonishing that in the rich Anglo-Indian and Franco-Algerian literature of the first half of the 19th century only rare cases are found.

Even Lebert (Virchow's Arch., 1857) in a series of articles on the etiology of abscess of the brain and in his rich bibliography (1833-1856) on the same subject does not mention any which followed dysentery or liver abscess. It is therefore not at all astonishing that the great classical treatises such as those of Tournay (1855), Huguenin (1876), Bergmann, Oppenheim, and Grasset, do not make any mention of the condition; and the same absence is to be noted in a certain number of those written on the subject of cerebral abscess. Cornil and Ranvier in their Manual of Pathological Anatomy (1907) do not record any cases.

Predisposing Causes.—These are generally the same as those of liver abscess. It appears that the liver acts as a sort of zone of arrest, and its rôle towards the amoeba is comparable with that of a lymph gland placed in the path of the lymphatics to oppose the rapid invasion of bacteria.

The cases of brain abscess occur, it is true, in debilitated cases profoundly impregnated for a long time with chronic dysentery, with multiple abscesses opening in the bronchi and abscesses in the lung parenchyma. On the other hand, it is remarkable and really inexplicable that some cases of brain abscess occur in cases where liver abscess is almost cicatrized, and even when it is cured. It has often been noticed that the cerebral

condition has developed when the patient has just left the hospital. We seem to have a phenomenon here analogous to the disappearance of the diarrhoea when a hepatitis suppurates, to return when the abscess is evacuated.

PATHOLOGICAL ANATOMY.

Dysenteric abscess of the brain is solitary in the majority of cases. It is found with the same frequency on the right or left side.

Amongst 45 cases Legrand found:—

12 abscesses (solitary) in the left hemisphere.

10 " " in the right hemisphere.

6 " " bilateral.

6 " " opened into the lateral ventricles.

10 " " indeterminate.

1 " " in the left lobe of the cerebellum.

As regards the localization in the different regions of the brain, practically every part of the brain except the pons and the bulb have been found affected either primarily or secondarily by the destructive process, which appears to the naked eye to have spread from the cortex, or grey matter. The only case on record of abscess of the cerebellum (left lobe) is that reported by Buchanan (case 18 in Legrand's list).

According to Legrand the dura mater is more or less gorged with blood and is rarely adherent to the underlying lesions; sometimes there are soft adhesions, filamentous and fibrino-purulent. The arachnoid cavity is filled with clear cerebrospinal fluid. Examinations of fluid from lumbar puncture have always been negative; the presence of pus has never been recorded though a few polymorphonuclears may be present. The pia mater may be healthy; if the abscess be deep, occasionally oedematous, of a gelatinous appearance over the affected lobe or hemisphere.

When the lesion is near the surface the pia mater is greyish, reddish or violet in colour, swollen and projecting—never spontaneously broken but tearing easily on removing the brain.

Purulent diffuse meningitis is rare but often there are foci of inflammation of greater or less extent on the surface of the convolutions. In some of Legrand's cases the microscopic examination showed that these foci contained amoebæ which were multiplying and were carried hence by the lymphatics and arterioles to the depths of the nervous tissues.

The size of the abscess may vary from that of a nut to that of an apple. Some are small, ovoid, lenticular or flattened, an inch or less in diameter, while others are of large size—one recorded by Westphal containing 50 grammes of pus.

When the abscess is large the convolutions surrounding it are flattened. Viereck has noticed a diffuse reddening of the cortex over the lesion resembling a recent contusion. On section of the brain—either horizontally or vertically—the cerebral substance surrounding the abscess cavity shows an aureole of punctate hemorrhage.

The contents of the abscess are variable in appearance, resembling an abscess of the liver—viscous, thickened, grumous, in colour a dirty white, grey, yellowish, or greenish; sometimes in acute cases the hemorrhagic tendency is so marked that the pus is like crushed strawberries. Small fragments of necrosed cerebral tissue detached or suspended

by filaments may be present floating in the pus. In the foci which have become phlegmonous the contents of the abscess cavity are distinctly purulent, yellow and homogeneous or more rarely putrid.

The wall is irregular, serpiginous—often the section gives the appearance of multiple abscesses, separated, although in reality there is only one large abscess composed of a system of small cavities ramifying and communicating with each other in the depth of the subjacent tissues (Westphal).

In recent acute cases there is no limiting pyogenic membrane; there is evidently a progressive ulcerative and hæmorrhagic process. In the older cases the ulcerative and hæmorrhagic process seems to be arrested, the walls become dry and dark, due to deposition of blood pigment. If these foci—either ulcerous or partially encysted—are not situated in the motor track of the brain they may remain for a longer or shorter period residual, or latent, and be discovered only at the autopsy. But when an infection occurs or any new inflammatory condition, this residual abscess may lose its passivity and become phlegmonous; the delicate membrane surrounding it, if present, is suddenly broken, and the surrounding cerebral tissue is invaded, leading to an epileptiform convulsion.

By analogy with liver abscess, Legrand attempts a classification of cerebral abscess of dysenteric origin as follows:—

- (1) Acute necrotic abscess—purely amœbic with hæmorrhagic tendency.
- (2) Residual, post-mortem; dry abscess contents with blood pigment, and dead amœbæ; latent form.
- (3) Phlegmonous abscess—acute, rapid development, complicated with virulent bacterial infection.
- (4) Encysted abscess, old and complicated by bacterial infection, often sterile but susceptible of flaring up.

All these forms arise from the same process, of which they are only different stages of evolution more or less modified by the existence of a secondary bacterial infection.

Microscopic Examination.—Many histologic descriptions more or less complete have been given by Westphal, Kartulis, Viereck and Legrand. The wall of the abscess cavity stained by Van Gieson's method consists of two layers, the inner reddish green and the outer reddish blue (Westphal).

The external layer is formed by lamellæ of connective tissues of fine reticular character, and contains numerous ramifying vessels. In the neighbourhood of these two layers there is an agglomeration of two kinds of cells.

- (1) Small round cells—infiltrating the tissues generally.
- (2) Large epithelioid cells round or oval, originating from the nerve tissue—described by Westphal and Kartulis in their cases.

They may be distinguished from amœbæ by their large size and the absence of vacuoles (Kartulis). This author has reported the presence of amœbæ in the tissues near the abscess cavity. In order to investigate the condition more exactly, it is convenient to examine several foci in different situations—particularly the smaller ones at the beginning of their evolution. The examination of sections shows the primary lesions.

Superficial Abscesses are seen still covered by an

intact layer of pia mater on the surface of the convolutions. There is even at some distance from the suppurative focus a marked oedema of the meninges. More often there is a fibrinous exudate with occasional leucocytes. The section of the subjacent abscess shows a considerable number of polymorphonuclear leucocytes, often of normal appearance, but scattered here and there are irregular globules of pus with fibrinous, hæmorrhagic patches. The hæmorrhage may be so marked that there may be small clots floating in the pus. When the lesion becomes old, more or less numerous crystals of hæmatoidin are present. The fibrin appears as a close network or in compact irregular patches. In the abscess cavity are vessels recognizable by their wall of fibrous connective tissue, often thrombosed, adhering to fragments of cerebral substance of which they occupy the centre. The perivascular lymphatics are oedematous and contain a considerable number of leucocytes and eosinophiles.

Deep abscesses are found in the cerebral substance. The contour is irregular, sometimes well defined, at other times having a radiating appearance; and one often sees small foci of hæmorrhage on the periphery of each small abscess.

In both varieties of abscess the amœbæ are most numerous at the periphery. They are easily recognized with the double staining in the form of lumps, or nodes in the middle of the cerebral substance. They are voluminous and round or oval with large eccentric nuclei, often containing in their protoplasm numbers of red corpuscles. With the leucocytes they find their way into the nerve tissue and small foci are to be seen which may or may not be connected with the principal focus. The abscess cavity increases in size by centrifugal erosion and by the successive fusion of all the small necrosed areas.

To Recapitulate.—The amœbæ are carried by the circulation via the circle of Willis to the brain, where successive lesions are evolved in the cerebral tissue.

(a) **Perivascular and Vascular Lesions.**—The process originates from small areas of true amœbic meningitis, then infection reaches the depth of the nerve tissue. Amœbæ and polymorphonuclears increase in the perivascular channels, gradually forming small milary abscesses. Then as a result of the pressure of 8 or 10 layers of leucocytes, and possibly also of amœbic toxin, thrombosis of the arterioles is produced with at first partial and finally total obliteration of the lumen, and the walls of the vessel undergo a necrobiosis.

(b) **Hæmorrhagic Lesions.**—These are produced by the rupture of the necrosed vessels. From these arise the small clots and clumps of fibrin and in old lesions the hæmatoidin crystals.

(c) **Softening Necrosis or Neurolysis.**—Irregular fragments are present at this stage, still containing in their centre the remains of a vessel which supplied the part. Myelin cells and cylinders in various stages of disintegration result.

(d) **Pus.**—The microscopic examination of the

contents of the abscess cavity shows all kinds of debris derived from the neurolysis and the inflammatory reaction resulting therefrom. The extent of the necrosis or suppuration depends upon the age of the abscess and the extent and nature of a secondary infection. The debris consists chiefly of nerve fibres, hæmatin crystals and pus. There may be also bacteria of various kinds and amœbæ.

(e) *Amœbæ*.—Amœbæ were first discovered in a dysenteric cerebral abscess by Kartulis in 1904. If the parasites are alive and the preparation warmed slightly they can be easily recognized by their movement: permanent preparations can be made by fixing and staining direct smears by Heidenhain's method or by making sections and using a double stain.

(f) *Bacteria*.—There are only five or six observations where cultures from the abscess cavity have been made.

In 1904 Kartulis found *B. pyocyaneus* associated with amœbæ. In another case—published by Legrand—the same author found in sections stained by Gram's method, micrococci, streptococci, and bacilli.

Jacob records that in one of his cases he found by culture *B. coli communis*, but in another case aerobic and anaerobic cultures were sterile.

In one of Legrand's cases anaerobic cultivation on Loeffler's serum impregnated with hydrocele fluid gave a very small micrococcus in pure culture. In another case aerobic cultures proved sterile but anaerobic culture showed after four days:—

- (1) Numerous small colonies of micrococci (very small).
- (2) Two or three colonies of bacilli.
- (3) Two or three colonies of staphylococci.

It is impossible to draw conclusions of any value from these observations.

ANATOMICAL DIAGNOSIS.

The principal points in differential diagnosis may be indicated as follows:—

(a) *Bacillary dysentery* may give rise to nervous symptoms, paralysis, hemiplegia, &c.; but the changes in the brain or cord, &c., are due to toxin and not to the dysentery bacilli, which are confined to the intestine.

There are small areas of softening which may be found in the grey matter in various regions—polioencephalitis or poliomyelitis. Laveran has recorded cases of abscesses in the cranial cavity due to bacillary dysentery, but these developed as a result of thrombosis of the venous sinuses, and the pus showed only pyogenic organisms—the result of secondary infection.

(b) *Metastatic abscesses* due to various bacteria. Abscess may develop in the brain as a result of infection by contiguity or metastasis.

The abscess by contiguity, 50 per cent. of which are of otitic origin, need not be further dealt with. The metastatic abscesses may arise from any purulent focus—from an acne pustule to a large abscess in the chest cavity. Abscesses of this class are usually at the base, and more often in the white

than in the grey matter. The pus has a very variable appearance, but shows no resemblance at all to the distinctive character of pus in amœbic abscess.

(c) *Caseating Tubercle of the Brain*.—This is found of the size of a hen's or pigeon's egg, and may resemble closely an amœbic abscess. The diagnosis is made on microscopic examination. Tubercle bacilli are abundant in the caseous material and pus.

(d) *Gumma of the Brain*.—Varies in size from a pea to a nut: the caseous centre shows no tissue destruction under the microscope. Schaudinn has shown the presence of *Spirochaeta pallidum* at the periphery of a gumma of the brain.

(e) *Actinomycosis*.—This is a rare condition following on actinomycosis of the lung. The mycelial filaments of the fungus are diagnostic.

PATHOGENESIS.

The formation in the brain of purulent collections resembling the pus of liver abscess—observed in the course of dysentery—has given rise to much speculation as to its mode of origin.

Morehead and the Anglo-Indian School considered that the abscesses were of metastatic origin. Then came Virchow's doctrine of *embolism* in 1853. Valassopoulos in 1884 recorded 5 cases at the Greek Hospital, Alexandria, and suggested the theory of *septic embolism*. In 1904, Kartulis, of Alexandria, was the first to record 2 cases of cerebral abscess in which amœbæ were found in the pus. Legrand's observations followed these in 1905, then the case of Viereck, then another (unpublished) of Kartulis, then the 2 cases of Jacob, and finally the case described herein and reported by Stout and Fenwick, completing the series of cases actually known.

It is now easy to explain the pathogenesis of dysenteric abscesses of the brain. Amœbæ enter the circulation via the mucosa of the intestine; although the intestinal lesion may be so slight as not to be visible to the naked eye. Their passage through the wall of the intestine was first observed by Harris in 1898 and confirmed later by Koch. Under ordinary circumstances the liver acts as a filter for the portal circulation and arrests the amœbæ which may have penetrated into the radicles of the portal vein; the amœbæ so arrested may produce a hepatitis. The barrier, however, may not be complete, and the amœbæ may enter the pulmonary circulation and infect the lung; or the lung may even be infected by the opening of a hepatic abscess into its substance. Just as occasionally hepatitis may be engendered by amœbæ without a preceding dysentery, so may the lung, or very rarely the brain, become infected, while the liver escapes.

Thrombosis and embolism of amœbæ may be produced. Marshall in 1899 noticed at an autopsy, on a case of amœbic liver abscess, that there was thrombosis of the portal vein, the vena cava containing amœbæ in the blood clots.

The amœbæ may be conveyed by the arterial system from the heart to the periphery and reach the pia mater, where they obliterate the arterioles and form a necrotic infarct. This is the starting point of the amœbic abscess.

SYMPTOMATOLOGY.

There are no distinctive signs of dysenteric abscess of the brain. The clinical features of any particular case depend on the localization and on the susceptibility of the host.

The cephalalgia, the coma, and other symptoms are those common to cerebral abscesses from other causes, and all diagnostic signs may be absent if the abscess develops in the so-called silent area of the brain. The course is rapid and fatal. The duration from the time of the appearance of the headache is usually from six to eight days, with fifteen days as the maximum.

CLINICAL DIAGNOSIS.

If there is an operation wound for abscess of the liver, or a more or less recent cicatrix, it is a help to the diagnosis; the difficulty is greater when there is no liver abscess or if the abscess is latent or has opened into the bronchi. When attention is drawn to the cerebral condition the ears and naso-pharynx should be carefully examined, and any other possible causes of cerebral lesions should be considered—tumours, abscess of otic origin, pulmonary abscess, pyæmia, tuberculosis, syphilis, actinomycosis, hydatid disease, and cerebrospinal meningitis.

Ophthalmoscopic examination has not given any positive result.

Lumbar puncture yields a clear sterile fluid with sometimes a few polymorphonuclears.

Legrand states that *agglutination tests* may give positive evidence of cerebrospinal meningitis, typhoid and bacillary dysentery; but with the improved method and technique as elaborated by Dreyer, and now in common use, it is not likely that these results will be confirmed. They certainly were not as regards enteric and dysentery in the case herein reported.

Bacillary dysentery does not cause any abscess of the liver or brain, but may cause a toxæmia with cerebral manifestations as in the following case reported by Gullard (*Union Médicale*, 1859, iv.) :—

A literary man, 46 years of age, suffering from epidemic dysentery—patient at Lariboisière. His general condition was quite good, when, suddenly during the night, somnolence and coma developed with complete left hemiplegia and hemianæsthesia, followed by death from coma two days later. At the autopsy dysenteric lesions of the intestine, kidneys, and spleen were found. The mesenteric glands were swollen, and the liver congested with commencement of cirrhosis. There was no cerebral lesion.

TREATMENT.

All the cases up to the present have had a fatal termination. Two points must be considered in effecting treatment—the virulence and diffuseness of the pathogenic agent and the rapidity of evolution of the lesion.

Surgical treatment has been employed on three occasions—in one case by Legrand and two others by Jacob. All ended fatally, but in one of Jacob's cases torpor and epileptoid movements disappeared after trephining and draining of the abscess cavity.

According to Jacob, if operative measures be undertaken this should be done at an early stage, and trephining should always be extensive, as it is essential to get as large an access to the abscess cavity as possible.

Medical Treatment.—Up to the present symptomatic treatment has not given any result. Nothing has ever been successful in relieving the cephalalgia.

Legrand suggests that, as in the case of paludism and syphilis, the best chance of successful treatment lies with anti-protozoal drugs, such as salvarsan and emetine; but it is to be noticed that in the case now described treatment first with emetine hydrochloride, and subsequently with the double iodide of emetine and bismuth, failed to prevent the extension of the infection from the liver to the brain.

As far as present experience goes medical treatment is apparently hopeless.

RÉSUMÉ OF PREVIOUSLY RECORDED CASES.

Legrand shows that out of forty-five cases, forty-three accompanied or followed liver abscess; of the remaining two, one showed amœbæ in the brain.

He refers to nine cases in which amœbæ were demonstrated in the cerebral abscess. He points out that these cerebral abscesses are not true abscesses, but a liquefaction secondary to an amœbic thrombosis with or without hemorrhage, the fluid being almost jelly-like, and resembling in colour gooseberry jelly, or, if hemorrhage has taken place, of a reddish or brownish colour; and further states that the amœbæ are found in the walls, and that anatomically and bacteriologically there is complete accordance with the so-called dysenteric liver abscess.

C. Morehead. "Clinical Researches on Disease in India," 1856. Vol. i, page 606. Abscess in the brain not suspected during life. Abscess in the liver, with pneumonia of the lowest lobe of the right lung, revealed by symptoms. There was vascular turgescence of the liver.

Llewellyn Phillips in *St. Bartholomew's Hospital Journal* of July, 1913, records a case of cerebral abscess secondary to amœbic dysentery and abscess of the liver.

The illness lasted eleven to twelve days from the first cerebral symptoms. Examination of the brain showed a small cavity in the left occipital lobe containing 1 or 2 dr. of semi-prulent thick fluid. The cavity had no definite lining membrane. The day before death, lumbar puncture gave a clear straw coloured fluid. Amœbæ were not found in the abscess, as unfortunately no microscopic examination was made. (See also his work "Amœbiasis and the Dysenteries.")

A. E. Sitsen. "Merkwaardige complicaties bij amœbendysenterie." (Remarkable complications in amœbic dysentery). *Genêsk. Tijdschr. v. Ned.-Indië*, vol. liii, 1913, pp. 700-716.

Two cases are described—(1) Thrombosis of portal vein, (2) liver and brain abscesses—both amœbic. As the second is of considerable interest it is here quoted in some detail.

Case 2. European, aged 30, admitted military hospital Buitenzorg (Java), November 16, 1910. Pain in right side—to shoulder blade. Painful to pressure in eighth intercostal space. Liver not palpable. Says he has had similar trouble every year since 1906. Denies having had dysentery, malaria or syphilis (but concerning dysentery and syphilis see below). Symptoms disappeared after rest in bed, November 21.

Re-admitted to hospital July 8, 1911. Some pains over liver—enlarged, very painful on pressure. Stools thin and watery. (No record here or elsewhere of any microscopic examination.) Rest in bed and application of ice. Symptoms disappeared and patient discharged July 25.

Again admitted, same symptoms, April 15, 1912. Liver enlarged, but not spleen. Blood examination negative. (Kind of examination not stated—probably for malaria parasites.)

April 20.—Rigors and sweating every day. No malaria parasites.

April 21. Painful spot located in ninth intercostal space. Case diagnosed "suppurative hepatitis" and evacuated to Wetlevreden.

At Wetlevreden, April 23, patient feverish, fever irregular, spleen palpable. Condition much as before. Slight pharyngitis.

April 25.—Liver puncture, without result.

May 5.—Intercostal and shoulder pains gone.

May 9.—Patient better. Wassermann reaction positive. Put on pot. iod.

May 20.—Salvarsan, intravenous (small dose, 0.3 gm.).

June 18.—Recurrent attacks of "clonic cramps coupled with slight mental derangement." No paresis.

June 20.—Has hallucinations with his attacks. Says his food is "poisoned." Much albumin in urine. Legs oedematous.

July 2.—Thinks doctor is trying to poison him from motives of revenge.

July 3.—Brings up bloody slime. (No tubercle bacilli found.)

July 4.—Hæmoptysis.

July 6.—Expired.

Post-mortem examination. The following are the chief points of interest:—

Large intestine: many "dysenteric ulcers" (from description typical amebic) "in various places." (Exact location not given.)

Lungs: right lung gangrenous, especially middle lobe, the branches of pulmonary artery entering which contain a "thrombotic mass."

Brain: a "soft area" in right parietal lobe "about the size of a gulden" (say a two-shilling piece). Brain fixed in formalin. On cutting through the "weak place" in the cerebral hemisphere, an abscess found "approximately the size of a nut" (walnut?) filled with thready greenish-yellow pus. Sections of wall of abscess showed contents to consist of cellular detritus, with many "mononuclear cells." "Many amebæ were found in the wall."

Liver: right lobe with adhesions. An abscess "about the size of a goose's egg" filled with thick pus. (A very long description, from which it appears that abscess was of multiple origin, old and long-standing; very thick capsule; amebæ found in sections.) There was a communication between abscess cavity and inferior vena cava; drops of pus could be expressed easily into cut end of vena cava before abscess was opened, and, after opening, a fine seeker could be passed through the aperture. (The author supposes the amebæ escaped into circulation through this, and so gave rise to infarct in lung, and abscess in brain.)

Kartulis. In his paper "Abscesses of the Brain following Abscesses of the Liver" (from the Egyptian Imperial Hospital at Alexandria), in the *Centralbl. f. Bakt.*, xxxvii, 527, 1904, reports that in his 384 cases of abscess of the liver, eleven cases of abscess of the brain occurred (about 3 per cent.). Of these eleven cases, ten certainly followed dysenteric abscess of the liver, and only one followed abscess of the liver of alcoholic origin with no dysentery, but with chronic stomach and bowel affection.

Kartulis succeeded in finding the dysentery amebæ both in the pus and in the stools, and was thereby able to explain the aetiological factors of these abscesses.

The first case was a patient 45 years of age. He had suffered for some time from dysentery, and noticed the first symptoms of hepatitis three months before admission to hospital. On his admission an abscess in the right lobe of the liver was diagnosed and the abscess opened. Examination of pus showed motile dysenteric amebæ and cultures gave *B. pyocyaneus*.

The wound healed quickly, so that on the eighteenth day after the operation there was only a small sinus which discharged a very small quantity of pus. On the nineteenth day

the temperature which had hitherto been normal rose to 38° C., and the patient spent a delirious night without sleep. He appeared to be in a toxicæmic condition, answered questions at random, and his speech was inarticulate. On the twenty-first day the morning temperature was 38.6° C.: the patient was apathetic and comatose and died during the night.

The post-mortem showed signs of long-standing dysentery. The liver was much enlarged. In the middle of the right lobe was a cavity the size of a hen's egg. On opening the skull, a protuberance of the left cerebral hemisphere was noticeable. When an incision was made in the prominent point, thick green pus ran out. The cavity of the abscess was larger than a goose's egg. The examination of material from the abscess revealed degenerate pus cells, the remains of ganglion cells, altered red corpuscles, and large cells which proved to be dead or non-motile amebæ.

In the second case the patient was an Arab of 40 years of age, who likewise had been admitted to hospital because of abscess of the liver. From the records it was found that he suffered from dysentery nine months previously, and quite recently had had signs of abscess of the liver. The operation was performed by resection of the tenth rib. The cavity of the abscess was the size of a child's head. The pus contained non-motile amebæ. Cultures proved sterile. For the first six days after the operation, nothing unusual occurred. The temperature, which before the operation was 38° C., fell to normal. On the sixth day the patient talked indistinctly and the usual signs of motor aphasia were noticed. On the seventh day the patient lay quite apathetic; he did not reply to questions. The pupils were dilated, and responded weakly to light, but there was no paralysis. Death took place during the night.

The post-mortem gave every indication of dysentery. In the right lobe of the liver there was a cavity larger than a fist. On opening the skull, an abscess cavity larger than a goose's egg was found in the third frontal convolution of the left hemisphere.

As before, the abscess lay in the white matter, but in this case the cortex was also implicated.

The result of the microscopic examination of the pus was the same as in the first instance. The amebæ were clearly recognizable, but again without showing any movement.

NOTES ON A CASE OF AMEBIC ABSCESS OF THE BRAIN.

The patient, C. B., aged 35, was admitted to the No. 1 N.Z. General Hospital at Brokenhurst, England, on July 11, 1917, with a diagnosis of "gallstones," and a history of frequent rigors, jaundice, pain in the region of the gall-bladder, and evening rise of temperature to 103° F.

In the clinical note by Major Stout and Major Fenwick, the following account is given:—

"He had arrived in England towards the end of February, 1917, having during the voyage from New Zealand spent a day ashore at Albany, and several days at Cape Town. He had never previously been out of New Zealand. While in camp in England in April, he had an attack of what he thought was influenza, with pain in his right side, 'just under the ribs,' and in his right shoulder. He thought he had one or two shivering attacks at this time. He recovered and was sent to France apparently well on May 27. From the time he reached France to the date he was admitted to hospital, June 15, he had several attacks of shivering at night, and these rigors continued with greater frequency after he was admitted to hospital. He stated that he had never had an attack of dysentery, had never suffered with diarrhoea, and had never noticed anything abnormal with his motions."

"In this hospital the patient had a nightly rise of temperature to 102°-103° F., with rigors at intervals of two or three days. He complained of pain on the right side on taking a deep breath and of a constant state of fullness and discomfort on the right side. He was sallow but not definitely jaundiced. On palpation there was marked tenderness in the region of the gall-bladder, and there was also tenderness in the right infra-axillary region. There was slight bulging of the lower ribs on the right side, and in this region there was some oedema of the skin, noted by the difficulty in pinching up the skin as

compared with the same area on the opposite side. There was an extension upwards of the liver dullness on the right side, in front, in the axilla, and behind. Breath sounds at the right base were faint, there was diminished vocal resonance, and tactile fremitus was absent. A few crepitations could be heard at both bases. X-ray examination: diaphragm was higher on right side, but moved freely with respiration. Liver shadow showed indefinite increase of density on right side." (Stout and Fenwick, *Lancet*, June 1, 1918.)

Further particulars in my notes of the case are as follows:—

July 14.—Blood smears were examined for malarial and other parasites with negative result.

July 16.—Urine. Normal.

Blood culture.—Sterile at three days.

Faeces showed no entamoebae or cysts, no worms or ova, and no bacilli of the enterica or dysenterica groups.

Blood count gave: Hemoglobin, 65 per cent.; red cells, 3,740,000 per c.mm.; colour index, 0.9; total leucocytes, 17,600 per c.mm.; polymorph leucocytes, 78 per cent.; small lymphocytes, 18 per cent.; large mononuclears, 2 per cent.; eosinophiles, 2 per cent.

July 26.—A diagnosis of *hepatic abscess* having been made, the patient was operated upon, and an abscess 4 in. × 4 in. × 5 in. evacuated. The *liver abscess pus* showed no entamoebae or evidence of hydatids; aerobic and anaerobic cultures were sterile.

July 31.—The *liver abscess pus* showed many actively motile *Entamoeba histolytica*. Direct smears showed no bacteria, and cultures were sterile.

August 1 to 16.—Emetie hydrochloride (hypodermically) 1-grain doses daily.

August 3.—Faeces showed cysts of *E. histolytica*. Examinations of the faeces over a period of several weeks showed these cysts to be present intermittently, but when present always in small numbers.

August 29 to September 9.—Emetine bismuth iodide by the mouth in 3-grain doses daily. No cysts were found in the faeces after August 31.

September 10 to 22.—Injections of quinine sulphate into the abscess cavity. Daily examinations of the pus from the liver abscess showed *E. histolytica* to be constantly present until September 17, after which they were not found. No cysts were, of course, ever found in the pus, though a somewhat ambiguous sentence in the paper by Stout and Fenwick might seem to indicate that they were. At no time from the date of operation (July 26) to date of death (September 22) were any bacteria found in direct smears of the pus from the liver abscess, and except for occasional colonies of *Staphylococcus albus*, cultures were sterile.

September 5.—Had a good night; comfortable day; out for two hours in chair. Temperature 102° F., 6 p.m.

September 6.—Had comfortable night; out in chair a.m. Temperature 101.8° F., 6 p.m.

September 7.—Had slept heavily; during day very dull and listless; no pain.

September 8.—Slept well; very listless in morning; not so well; very drowsy. Temperature 100.4° F., no pain.

September 9.—Talking sensibly at times, but at others wandering slightly; slept heavily; coughing a great deal; took nourishment; during day showed no improvement; very drowsy; bowels moved and urine passed involuntarily.

September 10.—A little brighter than previous night; passed urine involuntarily; took nourishment; during day condition not so good; pulse small and breathing shallow for a time towards evening; abdomen more distended; emetine stopped; pituitrin given $\frac{1}{2}$ c.c.; took nourishment well. Temperature 99.6° F.

From September 11 to 16 his condition showed very little change. There was no pain, and on the whole he slept fairly well, but was frequently disturbed by a troublesome cough. The pulse varied from day to day, being fairly good at times, at others becoming very weak, and he was put on strychnine and pituitrin. The urine and motions continued to be passed involuntarily, and remained

so throughout the rest of his illness. His mental condition improved somewhat, and he spoke rationally, and was usually cheerful and bright.

From September 17 on his mental condition was not so good; he remained conscious and quite rational and slept well, but was more drowsy and spoke very little. The pulse remained weak for the most part, but showed improvement from time to time. He took nourishment less readily, and vomited on one occasion. A troublesome hicough developed during the last three days of his illness, and on the day prior to his death he complained of occasional headache, which apparently, however, was not severe. The temperature during the last fortnight was usually about 101° F., the lowest reading being 99.6°, and the highest 102° F. There were no rigors and no ocular or localizing symptoms indicating brain abscess. The patient died on September 22.

POST-MORTEM.

"The abscess in the liver had shrunk markedly and was no larger than a golf ball, and around the abscess were some scarring and macroscopic degenerative changes. The condition was obviously rapidly recovering. There were adhesions of liver to peritoneum around the sinus and adhesions of pleura at site of suture. There was no abnormality of intestines, except some slight congestion of the mucous membrane of the caecum. Some hypostatic pneumonic condition was seen at base of both lungs, especially the right. In the brain an abscess of size of pigeon's egg was present in lower inner portion of right frontal lobe extending into right ventricle, and containing thin yellow pus. There was an area of softening in the brain around and localized basal meningitis in that area. Death was obviously due to the secondary abscess in the brain."

Laboratory Examination.—The only material supplied for post-mortem examination was a portion of the wall of the liver abscess cavity and material from the brain abscess. Unfortunately no histological examination therefore could be made of the brain, lungs and gut. The material from the brain abscess was grumous and reddish, containing many red blood cells, polymorphonuclear leucocytes, debris of neuroglia, nerve cells and myelin fibres; there was no sign of any membrane or sac. That part of the specimen which was pus contained very few amœbæ; but in the part of the material which contained many brain tissue cells, i.e., the softened tissue surrounding the pus proper, motile *Entamoeba* were found without difficulty; they were degenerate, feebly motile, and resembled exactly the *Entamoeba* seen in stale mucus from dysenteric stools and in stale liver abscess pus. Permanent preparations were made fortunately, and the diagnosis made from seeing the feebly motile amœbæ was confirmed by my friend, Mr. C. Dobell, at the Wellcome Bureau of Scientific Research, by the examination of the smears stained

by Heidenhain's method, which showed the amœbæ, though degenerate, sufficiently well for identification.

BACTERIOLOGICAL EXAMINATION OF PUS FROM BRAIN ABSCESS.

Direct smears showed the presence of staphylococci, streptococci, Gram-negative and Gram-positive bacilli.

Aerobic cultures showed staphylococci, streptococci, and *B. coli communis*.

Anaerobic cultures in alkaline meat broth gave a very unexpected result, as *Vibrio septique* was isolated first by Miss Robertson of the Lister Institute and afterwards by myself.

As there were no signs in the brain lesion typical of *V. septique*, it is probable that the organism or its spores were present in very small numbers, and that the tissues were able to deal with them or, at all events, to prevent or retard proliferation.

REPORT ON LIVER ABSCESS SPECIMEN.

By Capt. E. C. LOWE, N.Z.M.C.

Sections show the liver structure from wall of abscess cavity to be normal hepatic tissue, and the following points are obvious:—

(1) Well developed granulation tissue, bounding abscess cavity and lining with round cell infiltration.

(2) The dense fibrous tissue of the abscess wall which is well supplied with vessels, and in which some small bile ducts are seen.

(3) Groups of detached liver cells are found farther away from the cavity, which shows signs of regeneration.

(4) And still nearer the more hepatic tissue, a section of larger hepatic duct with groups of mucinous acinous glands lying with it, in what was the tissue of a branch of the portal canal.

(5) Among the nearer liver lobules there is great excess of fibrous tissue, but the boundary cells of these lobules show healthy outlines and staining reaction indicative of regeneration.

(6) Farther still the liver tissue is fairly normal in structure except that even there the interlobular connective tissue is abnormally dense and the vessels of the hepatic canals rather numerous.

The whole picture is that of an active and so far successful process of inflammatory absorption and tissue regeneration.

REMARKS.

Cases of amœbic liver abscess with no previous history of dysentery are common enough, but in the case under notice the occurrence of an amœbic cerebral abscess justifies placing the particulars on record.

It is worthy of notice that:—

(1) The patient had never been in any country in which amœbic dysentery is known to be endemic.

(2) The gut is reported to have shown no macroscopic evidence of dysenteric lesions, although cysts of *E. histolytica* were found in the stools.

(3) Courses of treatment first with emetine hydrochloride and afterwards with emetine bismuth iodide had no apparent effect on the amœbæ of the liver abscess, nor did they prevent the extension of the infection to the brain.

(4) The cysts of *E. histolytica* were not found in the faeces after the treatment with the double iodide.

(5) The amœbæ of the liver abscess disappeared after irrigation of the abscess cavity with quinine sulphate, though of course this may have been a coincidence.

(6) As has been noticed in previous cases, the brain abscess developed at a time when the liver abscess was healing satisfactorily, and until a fortnight before death the patient appeared to be doing well.

As far as I am aware this is the first case of amœbic brain abscess recorded during the War,¹ and although nearly fifty cases have been reported since Morehead first described his case in 1838, only two of them occurred in England, and in neither of these were amœbæ observed (Fuller, 1847, and Taylor, 1883). In fact, in only nine of all the cases previously recorded were amœbæ demonstrated.

I have to express my thanks to the D.M.S., N.Z.E.F., Colonel C. Begg, C.M.G., for his kind permission to publish this paper; to Professor Clifford Dobell, F.R.S., for his assistance in preparing it for the press; and to Captain E. C. Lowe, N.Z.M.C., for the sections and report on the liver abscess tissue.

Provocative Adrenalin Injection in Latent Malaria (A. Schittenden, *Munch. med. Woch.*, November 19, 1918).—A positive result from injecting one milligram of adrenalin is a rise of temperature and the appearance of plasmodia in the blood. The effect may not be produced for several days, two injections may be required. A negative result does not exclude possibility of the presence of latent malaria.

The Blood Pressure in Malaria (E. Jeanselme, *Press Médicale*, November 25).—The maximal arterial tension in ordinary malaria past the acute phase keeps at a certain level all the time, but the minimal tension varies within a remarkably wide range with every attack. This shows that the myocardium is clinically sound while the vascular tension fluctuates to a remarkable extent. The discovery of a drop in the maximal tension thus should warn that the malaria is passing into a pernicious phase or the heart is showing signs of weakening. The suprarenals seem to suffer during the malarial attack, and this may be the explanation of the upset in the vascular tension, the suprarenals either functioning to excess or becoming insufficient.

¹ Since writing this, I find that Faulds (*Glasgow Med. Journ.*, Dec., 1916) has reported a case of occipital brain abscess, empyema, and liver abscess, all operated on, in a soldier with a history of amœbic dysentery; but he does not record having found amœbæ in any of the lesions, nor does it appear to have occurred to him that all three may have been due to a common cause—*E. histolytica*.

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APRIL 15, 1919.

UNIVERSITY OF HONG-KONG.

ADDRESS BY THE HON. DR. LIM BOON KENG.

On the occasion of his being elected an Honorary LL.D. of the University of Hong-Kong in January, 1919, Dr. Lim Boon Keng, of Singapore, addressed the assembly in the University Hall as follows:—

I find it extremely difficult to express in adequate terms my gratitude for the great honour which the University has conferred upon me. I appreciate the honour all the more because it has come from a British source—a centre of British learning at the very doors of China offering to the Chinese people the greatest gift—the best fruits of British culture—at the disposal of the British nation. Through the University the British Empire is extending the hand of goodwill and friendship to a great and ancient nation.

I observe on the shield of the University two words, or rather, two phrases that shine forth like great lights, showing up the very basis of our human culture, as they involve, in fact, the guiding principles that must determine the great discussions to be held by the wisest men of the nations who are assembling to-day to consider the peace terms to be imposed upon the barbarous Germans. The Latin legend of the crest is a very apt translation of the Chinese phrases—*Ke-wu* and *Ming-te*—but I am afraid many students may not fully realize the true meaning of *Sapientia et Virtus*.

The word *Sapientia* has undergone changes in meaning in the course of time. It was in the Middle Ages rendered "wisdom." It represents the best results of *Ke-wu* or Science as we should translate the phrase in modern English. Then there is the other expression *Ming-te*, which the late Dr. Legge had translated "illustrious virtue." With all humble submission to such a venerable authority, I venture to think that "illustrious virtue" is too learned and ponderous a phrase. The Latin *Virtus*, in the sense employed by the Stoics, with emphasis on the *vir*, has no exact equivalent in modern English, but it is the right meaning of *te* in Confucian literature. What do we mean, after all, by these words? They indicate simply the application of knowledge to the necessities of life, subject to moral restraints. In that Chinese phrase *Ke-wu* we have the basis of modern science—the investigation of things. But science, by itself, does not suffice to maintain civilization, as we have recently seen how science when detached from *Virtus*—in spite of *Sapientia*, a wisdom as the ancients translated it—has simply developed into German militarism.

And so this University standing at the very doors of China has a great message and a great duty to fulfil. I have heard it said that it is difficult for the University in Hong-Kong to serve as a centre of education for the regeneration of the Chinese people. I do not concur with this view. I think a great deal can be achieved by a University such as ours before the Chinese will be ready to have a proper University of their own, because, after all, a University should not be only a factory for "turning out" machines or mere professional experts. The University must impart something more than technical knowledge and professional skill. True it must provide its students with a complete view of life, but it must also bring to bear upon them its

salutary influence, so that they will not only have gained a knowledge of life—but, what is infinitely better, they will be able to live with wise teachers in such a way as to get the inspiration to live in their post-graduate days the noblest life known to mankind.

It is therefore very auspicious that the University authorities have wisely chosen two texts from the Confucian classics to be the motto and the guide of all the succeeding rulers of this great centre of learning. In a recent volume dealing with the great problems that will arise in the future between capital and labour in different parts of Europe and the world, there is a paper by the Bishop of Birmingham in which he says that it is curious to discover in the Confucian classics the ideal that is worthy of the consideration of the Twentieth Century. That ideal is to be found in the saying of Confucius: "If you wish to establish yourself, seek also to establish others." The idea is that education in its best and highest sense is only the means towards the attainment of the perfect life, and that *not* for the individual alone, but also through the perfection of the individual for the family, the nation, and the world. The principle of education is that a man must endeavour to make himself perfect in every way, exercising all his faculties, and training all his senses, so that the eye can appreciate beauty, the ear can understand harmony and so forth, till the mind becomes the willing instrument of the spirit. Thus the individual in the totality of his being is *en rapport* with Nature. But this is not all. The cultivation of the arts and the sciences should never serve merely as the means of self-gratification or as the stepping-stone to advancement, wealth and glory for self. Neither must it aim solely at the prosperity and happiness of the family, for the latter is after all only a unit of the social organism. "The perfection of self" in the Confucian ethics implies the acquirement of altruism as an active force to extend all the benefits of education perceived by the individual to the family, through the family to the nation, and through the nation to all mankind. Therefore the same enlightenment that leads the individual to seek perfection for himself, urges him to diffuse the spirit that gives life to understanding, to refinement, and to culture, so that the whole human family may attain to the peace and happiness which he, the individual, is seeking for himself. This is, as no doubt everyone is aware, the great ideal of Confucianism, and it cannot be an unworthy programme for a University.

We have heard the Pro-Vice-Chancellor speaking in feeling terms when he appealed to His Excellency for the provision of adequate funds for the necessary requirements of this centre of learning. May I venture as a visitor and a stranger from a neighbouring Colony to offer my criticism or opinion of certain views as to the position of the Hong-Kong University to-day. Speaking now as a graduate, I feel justified in saying a few words to express what I feel about

our University. In my humble opinion, the University should not and should never be in want of the necessary funds. The Government of this Colony must not look upon the Hong-Kong University merely as a little colonial concern. If I might be bold enough to employ a figure of speech, I should call the University a great British lighthouse built upon the most prominent rock upon the China coast in the darkest age of Asia. At present chaos in the shape of a political typhoon rages throughout the troubled waters of Chinese life, and darkness reigns supreme. The British Empire has therefore with characteristic generosity built a great lighthouse in Hong-Kong, and the late King Edward, whose memory the Great War has taught us to bless, declared that this was the gift of the British nation. Surely it is not asking too much to demand that the British Empire and the British Colonies especially should see that that British lighthouse should be properly and efficiently lighted. Surely the British Empire, which has been prepared to sacrifice its best manhood for the defence of Liberty, will not be found wanting in such a good cause where the cost is so small and trivial. I trust your Excellency will pardon me if I ask the Governor and all the members of the Civil Service of the Colony to regard the University as the great lighthouse of the British Empire in the Far East. We are building up a structure not only in material things, for over and above the things that are visible there are elements of greater permanency with light to light up the whole of mankind. Therefore, if we regard our University as a British institution intended as the means of providing the gift of British culture to the Chinese people, we may be sure that the British Empire—particularly the Colonies—will respond to any reasonable appeal by the Government of Hong-Kong.

Many thoughts come to one on such an occasion as this, but it is impossible in this short address to consider them all. However, before concluding my speech, I wish to emphasize the fact that if the University were to help China in any way at all, the students and the graduates of Chinese race should not forget that they were Chinese. It is hardly necessary in this hall for me to justify my position as a British subject, as a lover of British ideals, or as a loyal and humble member of the British Empire. The lessons of psychology and history—especially of the long annals of the Chinese nation—show that a man is a better and more loyal subject when he does not forget the source from which he has sprung. The French Canadians have not been ashamed of their French nationality, the Boers are proud of their Dutch origin, the Welsh make much of their Cymric ancestors, and who dares question the Scot as to whether he has a native land of his own? So surely a Chinese who is a British subject does not need to become denationalized in a linguistic, psychological, or ethnological sense on account of his political allegiance. There are good scientific and philo-

sophical reasons for believing that nationalities develop best and most happily along definite lines of least resistance acquired by long generations of adaptation and inheritance. The happiest results, therefore, will be achieved when the Chinese, whether subjects of alien Powers or not, coming to study in this University, do not forget that they are Chinese. Whether they come from the United States, Australia, or Malaya, or from the great Republic of China, they will surely be better citizens in the future if they can manage to conserve whatever is beautiful, whatever is good, and whatever is wise in the old traditions of China, while they strive to imbibe the spirit of British Democracy with its great ideals of veracity and justice and law and freedom—which have built up the grandeur and the might of the British Empire. If with the virtues truly characteristic of the British they succeed in combining reverence for the aged, respect for authority, love of order, and enthusiasm for learning, so conspicuous in Chinese institutions, they will have equipped themselves fully for the uplifting and the amelioration of the great Chinese nation. Then they would be able to go back amongst their people and—perhaps the Chinese would excuse me for my plain language—these young men, wise, learned, but humble, will bring with them piety, knowledge, patience, skill and humanity to relieve the Chinese nation of that terrible paralysis of the senses, and one is almost tempted to say, of the mind—that moral and spiritual malady which accounts for all the symptoms of decadence of what was once a brilliant civilization. When that paralysis shall have passed away, then, and only then, will the Chung-hua Republic wake up, recover her senses, and banish for ever the sights, the smells, the sounds, and the thoughts at present characteristic of Chinese surroundings—the obnoxious and disagreeable evidences of national degeneration and decay! Then shall arise in the Flowery Land a rejuvenated “Middle Kingdom” with beautiful cities, clean homes, high ideals, happy children, refined women, and heroic men, excelling the best features of the glorious times of the T’angs and the Sung in Ancient China.

LONDON SCHOOL OF TROPICAL MEDICINE.

THE following list of candidates passed the examination of this school at the termination of the fifty-ninth session (January-April, 1919): Sorour, M. F., Smyly, H. J. (with distinction), Seelly, E. St. J., Leembruggen, H. U., Kyle, V. B., Bostick, J. B.

Variciform Hemorrhagic Rash in Pneumonia (O. Löwy, *Deutsche med. Woch.*, November 21, 1918).—An Italian prisoner on the ninth day of pneumonia had pustular umbilicated rash. *Post-mortem* there was hæmorrhage in the dermis and in epidermic cavities, containing pneumococci.

Annotations.

Gallstones in the East Indies (C. D. De Langen, *Mededeel. v. d. Burg. Geneesk.*, 1918, No. 7).—Only from 3 to 11·2 per cent. cholesterol was found in gallstones found in fifteen cadavers. In only one of the cases had the cholelithiasis been suspected during life. There have been only thirty cases of gallstones diagnosed in the last ten years in the Government infirmaries among the 422,943 admissions. These figures confirm previous statements as to the rarity of gallstones in the East Indies, and the exceptionally low cholesterol content of the blood in the natives.

Myristica (Nutmeg) in the Treatment of Amœbic Dysentery (J. Leidy, *Medical Record*, March 1).—After describing the history of the use of nutmeg and its medicinal properties, the use of the powder and oil are considered. The dosage is 25-20 grains of grated nutmeg given thrice daily after meals for one week, twice daily the second week, and daily the third week. The oil was too irritant for use. Investigation to discover an amœbicide in the essential oil of nutmeg. Trial of nutmeg especially in carriers of *Entamoeba histolytica* is desirable, and investigation of the active principles of the essential oil.

Contagious Jaundice with Spirochætes and Symptoms suggesting Blackwater Fever (W. Schöffner, *Mededeel. v. d. Burg. Geneesk.*, 1918, No. 7).—Numerous spirochætes were seen in the blood of a robust young native of Java who died within two days with symptoms of acute blackwater fever. Photographic reproductions of the microscopic findings show the spirochæte without coils. Inoculation of guinea-pigs with the patient's blood was constantly negative, although it was swarming with the parasites. It is possible that young guinea-pigs might prove more susceptible, and he urges that they should be given a trial in such cases, as also all other laboratory animals and the larger domestic animals. Perhaps by so doing an intermediate host may be discovered. In two other cases the disproportion between the serious general condition, suggesting severe poisoning, and the objective findings was striking; inoculation of guinea-pigs was also negative, and no spirochætes were found in the blood, but possibly this was due to inefficient technique. In the case mentioned first, various modifications of the technique had to be tentatively tried before the spirochætes finally showed up. In cases of blackwater fever in future, the blood should be examined at the earliest possible moment, and the eyeballs should be examined for evidences of jaundice. The high leucocytosis, pains in the calf, and the serious general condition will aid in differentiation.

Blackwater Fever (C. D. De Langen, *Mededeel. v. d. Burg. Geneesk.*, 1918, No. 7).—In nine cases of blackwater fever, including two in Europeans, the resisting power of the red corpuscles seemed to be normal, but the residual nitrogen was exceptionally high even in the cases without anuria. In treatment, heart tonics and calcium salts were the main reliance, and eight of the patients recovered. Quinine was not given except to one patient with tertian malaria. Cholesterol given in the form of egg yolk did not display any benefit. In the last case, intramuscular injection of 15 c.c. of blood serum from a normal person was followed by a drop in the temperature. In two days the defervescence was complete, while the hæmoglobin disappeared from the urine, and except for the severe anemia the patient seemed perfectly normal. Two months later the patient developed the same set of symptoms anew. Immediately he was injected with serum—this time fresh dysentery serum was used as it happened to be on hand—and the next day the urine was normal once more. These two experiences justify further attempts in this line.

Purgation before and after Abdominal Section (H. T. Byford, Western Surgical Association, December 20, 1918, *Medical Record*, February 8, 1919).—Purgation should not be used as a routine method, but only the right drug should be administered at the right time under the right conditions. Early purgation is needed when a large incision has to be made in the middle or lower zone of the abdomen with considerable displacement of intestine, with liability to formation of adhesions of displaced or kinked intestinal loops impeding peristaltic action.

Delay in purgation is needed after resection or incision of the intestine. Early purgation may not be necessary but may be desirable with sutured or denuded areas, if peristaltic action is fairly active.

Purgation may be needed by special circumstances after slight exposure of the intestine. Patients chronically constipated require appropriate diet and treatment, but not just before operation. Patients whose bowels act regularly up to the time of operation do not need purgation at any time, least of all an enema during the night before operation to disturb the night's rest.

Suprarenal Apoplexy (K. Löwenthal, *Berlin med. Woch.*, November 25, 1918).—A case of double pneumonia developed intense abdominal pain, constipation, profuse perspiration, slow irregular pulse, with the temperature normal. *Post-mortem* hæmorrhages were found in both suprarenals, in one the medullary substance was destroyed, and greatly involved in the other; the cortex of the glands was little affected. The symptoms were caused by loss of function of the sympathetic due to renal insufficiency, indicated by the slow pulse of 44 to the minute, differing from the rapid pulse of peritonitis.

Abstract.

HOOKWORM INFECTION AMONG TROOPS.

TREATMENT WITH OIL OF CHENOPODIUM.

By R. H. KNOWLTON.

THE present investigation was largely patterned with two main objects in view: first, to get some idea of the severity of hookworm infection among Southern troops; and second, to check up the efficiency of the treatment used in this hospital. With the exception of thirteen negroes, who came from their organizations, all the subjects used were chosen at random from the convalescents in the wards without reference to the degree of infection, although all were known to have positive stools. They were practically all from the Carolinas and Florida. A few had received treatment at their homes, but it does not seem to have been very effective, as one patient with 1,263 worms had received one treatment two months previously, one with 559 worms had received five, and one with 313 worms had received six.

A special building was set aside for the work in which the patients lived and where all work was carried out. The object and methods of the investigation were explained to the patients, and they assisted greatly in the work. They were cautioned to avoid all fruits and fibrous vegetables while under treatment.

METHODS OF TREATMENT.

According to the routine treatment used at this hospital, a light supper is ordered the night before, and a full dose of magnesium sulphate is given about 8 p.m. No breakfast is taken in the morning, and 1.8 c.c. of oil of chenopodium is given in six gelatine capsules (supplied by a pharmaceutical house), two every hour for three doses. Two hours after the last capsules, another full dose of magnesium sulphate is given. This method was followed in the first series, and gave an average of seventy-eight worms passed per patient. A similar group of cases were treated in the same way with the same oil expressed from the proprietary capsules. The oil was collected in a graduate and measured in a pipette, and exactly 0.3 c.c. put into hard gelatine capsules, which are very soluble in water; this caused an average of ninety-three worms passed per patient. In every case, whatever the laboratory findings may have been, each patient received at the end of four days a second treatment with freshly expressed oil, and this was repeated at similar intervals until it was evident that all worms had been removed.

In a considerable number of soldiers the infection was slight; all grades were encountered, some even severe.

Original Communications.

A SHORT NOTE ON THE RESULTS OF VACCINE TREATMENT IN FILARIAL LYMPHANGITIS IN BRITISH GUIANA.

By F. G. ROSE, M.B.Cantab., M.R.C.S.

Government Bacteriologist of British Guiana.

TO-DAY, thirty-nine years since the demonstration by Sir Patrick Manson of the method of transmission of *Filaria bancrofti* through its common intermediary host, *Culex fatigans*, though the medical fraternity and the more intelligent section of the lay public appreciate its truth and its significance, and have learnt to recognize all the varied manifestations of filariasis, filarial infection is as general as—indeed, according to some of the older generation of practitioners in this colony, more general than—it has been within the memory of its older inhabitants.

In spite of mosquito by-laws, the larvæ of the mosquitoes by which it is conveyed can be obtained from any of the vats in which the rain water is collected for domestic use, nor does there seem to be any hope of the extermination of this scourge until these receptacles are abolished and a pipe-borne water supply established in their stead.

Under these circumstances filarial lymphangitis, lymphadenitis, lymphocele, chyluria, and other conditions associated with the presence of filarial infection are among the commonest conditions which confront the medical practitioner in British Guiana, and their alleviation becomes a matter of considerable economic importance, so long as it remains true that no effectual progress is made in exterminating the chief agent in the spread of infection, *Culex fatigans*.

For some years, then, the writer, having confirmed Wise's discovery of a streptococcus in some of these conditions (Report of Tropical Disease Research Fund, 1907), and demonstrated it, moreover, in cases of lymphadenitis and lymphangitis (*British Guiana Medical Annual*, 1915), has been experimenting with a vaccine prepared from streptococci isolated from these conditions, and this short note is intended as a report of the progress which has been made with this method of treatment. After extended trial I arrived at the conclusion that the most effective method of giving the inoculations was in a series of three, the first inoculation consisting of 100 million dead cocci and the next two of 200 million, an interval of two weeks separating the inoculations.

The reactions following the inoculations are almost invariably mild, and the doses may be doubled in long-standing cases. With this vaccine I have inoculated sixty persons more than six months back, nineteen of these being of fairly long standing—that is to say, all longer than one year, and some two or three years or more since the first attack, the rest being recent cases. Of these nine-

teen, nine have had no recurrences since inoculation, while the others have had attacks varying in frequency and intensity; but most are positive that the attacks have grown milder in character.

Of the forty-one recent cases, thirty were inoculated a year ago or earlier, and none has had a single attack since.

Of the other eleven, three cannot be traced, two remained free for over a year, while the remaining six were done six months ago, and have yet had no recurrence.

It is a common experience that œdema which has lasted for a considerable length of time will gradually disappear. The method is now being given an extended trial in this colony, in Barbados Hutson has it under trial, while in Dutch Guiana, Königsloew, the resident surgeon of the military hospital, has had some success with it, and is also making further trial. The above is intended as a preliminary note; I hope to publish later the details of preparation of the vaccine, the strains used, and laboratory experiments carried out in the same connection.

EPITHELIAL XEROSIS OF THE CONJUNCTIVA IN NATIVES OF THE SUDAN.

By Major R. G. ARCHIBALD, M.B., D.S.O., R.A.M.C.

Pathologist, Wellcome Tropical Research Laboratories, Khartoum.

CONTENTS.—Introductory—Clinical History—Etiology—Pathogenicity—Classification of the Organisms—Remarks—Conclusions—References—Illustrations.

Introductory.—It is a noticeable feature that eye diseases are comparatively uncommon among the young and adult natives of the Sudan, in fact are rarely met with except associated with old age.

Recently, through the kindness of Captain Bousfield, Medical Officer of Health, Khartoum, an opportunity occurred of observing three cases of a condition simulating xerophthalmos or epithelial xerosis of the conjunctiva.

Clinical History.—Two of the cases were boys, aged 10 and 12 respectively, while the third was an adult. All were healthy natives of the Sudan.

In one of the cases, *Case I*, there was a definite history of a member of the same family being affected by a similar eye condition.

In all cases both eyes were affected with what appeared to be xerotic areas situated on the conjunctiva external and close to the corneal margin (fig. 1).

These xerotic areas caused neither pain nor discomfort, and were not associated with any inflammatory condition of the eyelids. The flow of tears was not in any way affected, vision was not impaired, and there was no evidence of night blindness.

The xerotic areas measured 0.5 c.c. in diameter, and were white in colour and of a viscid consistency; the more superficial layers could be readily removed

with a platinum hoop. The deeper layers, however, were more adherent to the subjacent epithelium, which showed a brownish pigmentation with congestion of the neighbouring blood-vessels.

The bulbar conjunctiva was moist, and could be readily moved into folds by gentle pressure with a platinum loop.

Scrapings of the viscid material forming the xerotic patches, when examined microscopically, showed the presence of epithelial cells undergoing keratosis. The cells appeared to be thickened and contained keratohyaline (fig. 2).

Etiology.—In every case the eye was well doused out with sterile normal saline solution, and smear preparations and cultures prepared from the viscid material.

Smear preparations showed large numbers of Gram-positive bacilli diphtheroid in appearance. They were present in the form of straight, curved and club-shaped rods with a granular or beaded endoplasm. Many of the rods showed double curves, and a few contained terminal granules which did not possess the staining characters of spores (Plate 3).

The bacilli were non-motile, non-acid-fast, and retained Gram's stain. They averaged 3 microns in length and 0.75 micron in breadth; larger forms measuring 3.5 microns in length were also present. Degenerate forms showing granules, but otherwise exhibiting poor staining properties, were also present.

Biological Characters.—The organisms obtained from the three cases grew best aerobically at 37° C., but were also capable of growth anaerobically on Loeffler's blood serum. Under anaerobic conditions they showed a more marked granular appearance than when grown aerobically. Growth did not occur at 22° C.

Cultural Characters.—Growth readily occurred on Loeffler's alkaline blood serum and Buchanan's glucose neutral red agar. On the former, growth appeared in twenty-four hours in the form of minute, raised, glistening grey colonies, more opaque in character, and more adherent to the surface of the medium than the growth produced by the Klebs-Loeffler bacillus.

On Buchanan's glucose neutral red medium growth occurred in the form of raised greyish colonies, which assumed at the end of forty-eight hours a very delicate pink colour which did not deepen in intensity.

No liquefaction occurred in either of these media.

On agar agar, growth was apparent at the end of forty-eight hours in the form of minute, raised, round, semi-translucent colonies, and somewhat resembling those of streptococci.

In broth there was slight clouding with a fine granular deposit.

On potato there appeared at the end of forty-eight hours a fine, white, almost invisible growth.

In gelatine at 22° C. no growth occurred.

In litmus milk there was slight acid production, but no clot.

Biochemical Reaction.—No gas was produced in the various carbohydrates and alcohols employed.

As the organisms isolated from Cases I, II and III gave different reactions in the carbohydrates, their results are noted separately.

Case I produced no change in glucose, levulose, saccharose, raffinose, dextrin, inulin, starch, salicin, glycerol, adonitol and mannitol. Acid was produced in galactose, rhamnose, maltose, lactose, erythrol and dulcitol.

Case II produced no change in glucose, levulose, galactose, rhamnose, lactose, raffinose, inulin, starch, salicin, glycerol, adonitol and mannitol. Acid was produced in maltose, saccharose and erythrol, and slight alkalinity in dextrin.

Case III produced slight alkalinity in glucose and no change in levulose, rhamnose, raffinose, dextrin, starch, salicin, glycerol, adonitol, dulcitol and mannitol. Acid was produced in galactose, maltose, saccharose, inulin and erythrol.

Pathogenicity.—

Guinea-pigs.—The organisms isolated from all three cases proved to be non-pathogenic to guinea-pigs. These animals received a subcutaneous inoculation of 0.5 c.c. of a broth culture twenty-four hours old, without fatal results or any local manifestation at the site of inoculation.

Rabbits.—The bulbar conjunctiva of a rabbit was gently scratched with sterile needle, and an emulsion of the viscid xerotic material obtained from Case I was placed on the abraded surface. At the end of five weeks there was present over the site of inoculation a xerotic area similar in character to that existent in the human case; the conjunctiva adjacent to this xerotic area showed brown pigmentation with dilatation of the blood-vessels.

Classification of the Organisms.—Their morphological and cultural characters assign them to a place in the diphtheroid group, which now comprises a large number of different types of organisms obtained from various sources.

In a recent and comprehensive study of the diphtheroids by Eberson, [1] this group is defined as having a morphological resemblance to the diphtheria organism, Gram-positive, non-motile, absence of spores, presence or absence of metachromatic granules, no gas production in carbohydrate medium. The organisms under consideration would conform to this definition, differing from the true Klebs-Loeffler bacillus by their cultural reactions and by their non-pathogenic effects on guinea-pigs.

Their cultural and other characters would place them as being closely allied to the xerosis bacillus first discovered by Kutschbert and Neisser [2] in 1884 in xerosis of the conjunctiva.

According to some observers, this bacillus produces no acid in glucose broth. Eberson, however, states that it produces acid in glucose, saccharose and maltose.

Knapp [3] studied the action of ten strains of this organism in 1 per cent. solutions of various

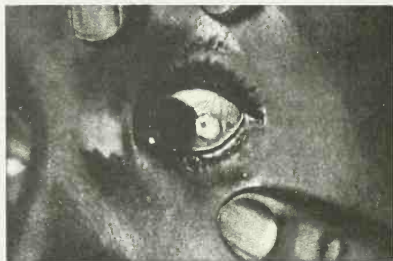


Fig 1.

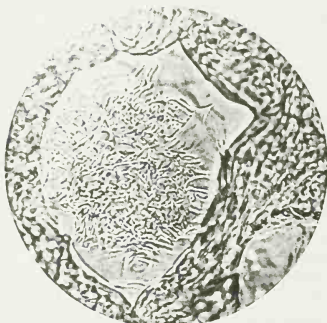


Fig 2.

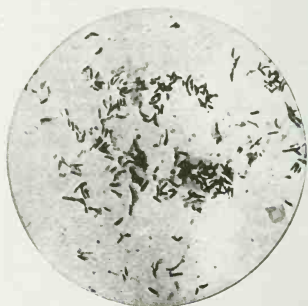


Fig 3.

To illustrate paper on "Epithelial Xerosis of the Conjunctiva in Natives of the Sudan," by Major R. G. ARCHIBALD, M.B., D.S.O., R.A.M.C.

sugars in the serum medium of Hiss, and found they produced acid with glucose, mannite and saccharose, and not with dextrin.

It is obvious, therefore, that different strains of the organisms may give different cultural reactions, as shown by the results obtained in the Sudan cases. Too much stress, therefore, should not be laid on these cultural reactions as differentiating tests. Moreover, it is possible that the pathogenicity of these strains may vary, and this may account for the fact of organisms of the *B. xerosis* group being found in healthy eyes.

Eyre [4] and others failed to find it in the normal conjunctiva, while Griffith [5] and Lawson [6] state it is the most common inhabitant of the conjunctival sac.

Stephenson [7] examined 6,209 London school children, and found 1.87 per cent. suffering from xerosis, and never failed to find the xerosis bacillus in this condition.

Deyl [8] isolated the bacillus in fifteen cases of chalazion and considered it the cause of the disease, and stated that he had produced chalazion formation in the eyes of animals by inoculation of the bacillus.

The xerosis bacillus is considered by some observers to be a variety of the diphtheria bacillus, and it has been suggested that the former on reaching the buccal cavity becomes under unknown conditions a true virulent diphtheria bacillus. Experimental proof, however, regarding the relationship of these two organisms is still lacking.

Remarks.—Clinically, the condition described in this paper resembles closely xerophthalmos or epithelial xerosis of the conjunctiva, a disease which apparently has not been previously described as occurring in the Tropics, and certainly has not been previously recorded as occurring in the Sudan.

In Fuchs's [9] classical text-book of ophthalmology, xerosis is stated to occur as the result of a local affection of the eye, e.g., trachoma, diphtheria, pemphigus, burns, &c., or as an accompanying symptom of a general disease occurring pre-eminently in persons who are depressed in nutrition and often associated with hemeralopia or night blindness.

In the cases described in this paper there was no sign of any local affection of the eye, and certainly no evidence of depressed nutrition. Moreover, the noticeable dry condition of the conjunctiva, which is usually described as occurring in typical xerosis, was a feature that was absent in the Sudan cases.

As already mentioned, organisms of the diphtheroid group were present in large numbers in the xerotic areas in all three cases; indeed, they were the only organisms obtained in culture, and it is therefore rational to assume that they were the causal agents of the condition, a view supported by the successful experimental production of xerosis by inoculating the abraded surface of a rabbit's conjunctiva with xerotic material obtained from *Case I*. The result of this experiment may explain the occurrence of xerosis in man, a slight abrasion of the conjunctival epithelium serving as a *locus minoris*

resistentiae for diphtheroid bacilli to multiply and produce keratosis of the epithelial cells.

Conclusions.—(1) A form of epithelial xerosis of the conjunctiva exists among the natives of the Sudan.

(2) In three cases observed, diphtheroid bacilli allied to the *B. xerosis* group were present in the xerotic areas.

(3) Experimental inoculation with material obtained from one of the cases produced xerosis of the conjunctiva in a rabbit.

Khartoum,

January 21, 1919.

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ILLUSTRATIONS.

- FIG. 1.—Xerosis of the conjunctiva. *Case I*.
- FIG. 2.—Photomicrograph of unstained scraping of xerotic material. $\times 800$ diameters.
- FIG. 3.—Photomicrograph of scraping of xerotic material showing diphtheroid bacilli. Jenner's stain. $\times 800$ diameters.

TRICHOPHYTON CURRII.

By ALBERT J. CHALMERS, M.D., F.R.C.S., D.P.H.
Director, Wellcome Tropical Research Laboratories,

AND

ALEXANDER MARSHALL,
Senior Bacteriological Laboratory Assistant, Khartoum.

CONTENTS.—Preliminary.—Present Case.—Remarks.—Illustration.—Reference.

Preliminary.—In 1914 we described a small epidemic of *Tinea Capitis* Tropicalis in the boys of the workshops of the Gordon College, Khartoum, as being caused by a new species of *Trichophyton*, which we named *T. currii*.

Years have passed and we have just met with a case of ringworm due again to the same parasite. In the interval, 1914-1919, we have examined many cases of ringworm here and have isolated the causal fungus, but till now we have never again found *T. currii*, which may therefore be considered to be rare in Khartoum, in which *T. violaceum* or a variety thereof appears to be common.

Present Case.—The present case is that of

ordinary ringworm of the hairy scalp occurring in a boy, aged about 7 years, living in one of the villages near Khartoum.

The fungus, which is easily seen in the hairs, belongs to the "Endothrix" variety, being confined entirely to the hair shaft, in which the so-called spores are arranged in ladder-like rows. Its mycelium was resistant to caustic potash.

In culture (*vide* text figure) the principal characteristics are:—

- (a) Very quick growth, starting in twenty-four hours after sowing the hair on Sabouraud's maltose agar medium incubated at 37° C.
- (b) White colour.
- (c) A central white knob surrounded by one or two slightly elevated rings and bordered by a slight fringe.

Clinically the ringworm was characterized by the infected hairs being broken off close to the scalp and by the absence of inflammatory lesions.



Trichophyton currii. New Case. Growth on Sabouraud's maltose agar at 37° C. for four days. Natural size. Photograph.

Remarks.—It belongs to neither the Crateriform nor to the Acuminate subdivision of the Endothrix division of the genus *Trichophyton*. It is not a colourless variety of *T. violaceum*, because it shows several differences already mentioned in the first paper. It is, however, more nearly related to the Violaceum group than to the Acuminate or Crateriform group of the genus *Trichophyton*.

Khartoum,

February 13, 1919.

ILLUSTRATION.

Trichophyton currii. New case. Growth on Sabouraud's maltose agar at 37° C. for four days. Natural size. Photograph.

REFERENCE.

CHALMERS and MARSHALL (1914). JOURNAL OF TROPICAL MEDICINE AND HYGIENE, September 1. London.

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THE JOURNAL OF

Tropical Medicine and Hygiene

MAY 1, 1919.

WHAT CAN METEOROLOGISTS DO TO HELP EPIDEMIOLOGISTS?

THE WEATHER.

IN Britain more perhaps than in any other country in the world is the weather a subject of conversation. It is hot, it is cold, it is beautiful and commended, or denounced and cordially

abused. Variations in the routine of the weather are heard of in well-nigh every climate in the world, but not with the frequency and extent of changes found in the British Isles. The explanations given by the British "observers" is that in any island, in the path of the Gulf Stream, variations are to be expected, and there the matter ends. We have, moreover, weather reports by Government authorities with prophecies as to what is coming or expected for a day or two ahead of time. With these pseudo-scientific reports which have been given for some fifty years we have to be content and receive them with what grace we may. To those who think more deeply it seems a natural question to ask, Why should there be variations in the weather? Naturally we expect the seasonal changes of spring, summer, autumn and winter, they are dependent upon "creative" causes; but why are these seasons themselves so variable that in the British Isles one summer is hot another cold, one is wet another dry, and again within one and the same summer cold, hot, wet or dry spells alternate. The usual explanation given, that it depends upon the amount of moisture in the atmosphere, or the fact that the Gulf Stream has altered to the north or south, as the case may be, or that the ice flow has come further south this year, and a multitude of opinions by the weather-wise, serve to silence an inquirer for the time being. We have not, however, had a suggestion, far less a scientific statement of the reasons for these variations; the quasi-scientific utterances of the so-called scientific observers are but exhibitions of reasoning in a circle; because there has been so much sunshine the atmosphere becomes more absorptive and will hold more watery vapour, and thus when the cold weather comes there will follow rain in proportion to the amount of moisture retained by the overcharged atmosphere, &c. One naturally asks, Why should there have been an excessive sunshine this year and less last year and the previous years? Another may ask, Why did the cold weather this year last so long compared with former years? And the reply may be that the icebergs came further south this year, or that the Gulf Stream altered, &c., and so on *ad infinitum*. If the scientific observers are content with such utterances then it is to be feared they cannot be considered scientists in any sense of the word. The record of temperatures, the direction of the wind, or the rise and fall of the barometer may in time bring about, more or less, accurate statements of the bearing each of these has upon the others; but that seems to be all the result of work of this kind that can be looked for. To afford a complete answer is evidently impossible, and we must fall back on the "weather-wise" folk of our day, as to what is exceptional. The weather we are told by tradition has a basis of uniformity, but exceptions are the rule. Are the authorities entrusted with recording, charting, &c., the temperature, the barometric readings, the force and directions of the wind ever likely to do anything more than record?

Will they ever be able to deduce from their observations general conclusions of any scientific value for practical use in the British Isles? Can they help the farmer, the sailor or the airman towards counting with any certainty what to expect for more than twenty-four hours ahead? If not, what are we to look forward to than that Nature is freakish in her moods and follows no law but that of being variable? The fifty years of recorded observations by Government authorities have helped but little towards elucidation of what was believed they might accomplish, and it is difficult to see how another fifty years of recorded observations will give us what we require to know.

If regularly occurs in one part of the world what are the reasons that it does not occur in others? It may be said there are questions that are incapable of being answered except on a broad basis, which involves the whole science of meteorology, and impossible to reduce to local prophecies. It is, however, true in certain regions that the meteorological conditions are fairly constant and regular, but in others the reverse. The pertinent question, moreover, is, What is the use of discussing such a question? You cannot alter the natural conditions of climate and we must make up our minds to variations in some parts of the world which are uncontrollable. There is but a mere definite statement of observation handed down through the generations from father to son, which possess but vague guides of what may be expected; these, however, are more often attended by a breach than by an observance of expectancy. The fact is, that traditional reports upon what to expect at particular times of the year were altogether annulled when the calendar was altered, over one hundred years ago; an alteration which in the year of grace 1919 throws our calendar out to the extent of twelve or thirteen days upon the old time when our traditions of weather, and what to expect, were formed. So that neither the traditional experiences nor the modern observations are calculated to be of service in the matter of what to expect. This article, it may be noted, is being written on April 28, 1919, when London is covered with snow to the depth of 4 inches, and the environment from some 6 to 12 inches.

Why should the seasons be uncertain? The sun rises and sets at times exactly known, the moon and tides follows similar rulings, and all planetary bodies coincide with prophesied times. The same amount of sunshine issues, it is to be presumed, year in and year out; if so why is there an excess of cloud and rain one year and the opposite obtains in the following year. The undoubted answer is, Weather depends on a conglomeration of conditions of air, sea and land. If so, what are these conditions which caused so marked variations? What causes the icebergs to come further south, when the given temperature by the sun heat is constant? Then we fall back on the Gulf Stream as an explanation. Is it a confession of ignorance to ask, Does the Gulf Stream really alter? Presuming it

does, we naturally ask the scientists why it does, and allowing that it does, can any accurate prophecy be made upon the effects of this alteration? Again the direction of the wind may be blamed! Why does the wind blow in fairly regular directions in some parts of the earth and not in others? Can these questions be answered or not? is a natural and obvious inquiry. Are they answerable or not? We have not mentioned telluric causes of variations—earthquakes, upheavals, &c. But that does not help; it merely extends the sphere of inquiry, and again the answer is, If telluric influences markedly affect one part of the world's climate, why do they affect others but infinitesimally? This article is a mere tilting at phantoms it would seem, and we may at once confess that Nature renders all observations of the kind null and void as far as local or even fairly widespread areas are concerned.

As hygeists and medical men we would wish to know something of Nature's laws in the study of epidemiology. Does disease vary with the climatological changes, with the seasons? If so, then we should like to know something of these variations with something even approaching scientific accuracy; something beyond such legends as "A green Yule makes a fat churchyard," or "It is to be a cold winter because the berries (which birds affect) are plentiful in the autumn," and a host of popular sayings which seem, at any rate nowadays, to prove unreliable.

It is time, however, to close this fruitless article and the search for something akin to stability in Nature's laws. If the search is fruitless, then it has shown that as medical men we must proceed without help from any observance of meteorologists; a negative result which, however, is a positive gain in getting rid of continuing to believe that we can be helped thereby either by the mythical records of the populace or the more scientific records of the meteorologists.

Annotation.

Schistosomiasis associated with Uncinariasis (J. J. Short, *Journ. Amer. Med. Assoc.*, March 1).—It is now known that *Schistosomum hamatobium* produces terminal-spined eggs only and *S. mansoni* lateral-spined eggs, while those of the *S. japonicum* are spineless. The first-mentioned variety causes urinary disease, the second rectal disease, and the third disease of the colon, rectum and mesenteric nodes.

The ovum, containing a living larva, leaves the body in the urine, and after coming in contact with fresh water, ruptures the enveloping capsule and escapes, swimming about actively by means of numerous ciliary projections. Later the larva, or miracidium, finds an intermediate host in the body of a certain snail—*Bulinus*—in the case of *S. hamatobium*. In the liver of the snail it

develops into great numbers of long cylindric bodies, the sporocysts and daughter sporocysts. Within each of these a cercaria develops and escapes into the water. This has the power of penetrating the skin of man and other animals, and so gains entrance to the blood-vessels and lymphatics. By this route it finally reaches the liver, where it is ready to begin a new cycle of development into the flatworm.

After about six weeks the worms reach maturity, unite in pairs and descend, against the current of blood, into the mesenteric and vesical veins, the bilharzian variety choosing the latter route, thus gaining entrance to the bladder wall, where the eggs are deposited. It seems natural to suppose that the suckers of the male play an important part, as they do in other animal parasites. The eggs being deposited in the bladder wall, the life-cycle of the parasite is completed, and in the majority of cases symptoms are produced.

The symptoms of the disease vary somewhat in different persons depending on the severity of the infection, the condition of the person, his occupation, &c. The most constant symptom is a terminal hæmaturia caused by the passage of the ova through the bladder wall, this passage in all probability being effected by means of the sharp terminal spinous process. Having fallen into the bladder, the ova are voided in the urine, especially in the last few drops excreted, which contain the greatest amount of blood. Pain is frequently present in the region of the bladder and along the urethra. Complications may arise from the cystitis, such as renal calculus, urinary retention, hydronephrosis or pyonephrosis, pyelitis, &c., which may cause serious consequences and even death; these give the usual symptoms of those conditions. Anæmia also may result, causing constitutional predisposition to other diseases. Other complications which are said not to be uncommon are urinary fistula and urethral stricture.

The pathology of this disease may vary from a mild cystitis with dilated vessels, catarrhal mucous membrane, slight hæmorrhage, and small vesicular or papular elevations, to a condition with marked thickening of the bladder wall, destruction of the mucosa, excrescences or new growths projecting into the bladder, encroaching on its capacity, &c. The trigon is the portion most frequently affected, and thickening of this may easily cause occlusion of one or both of the ureters. There is a tendency to the formation of polypoid growths within the bladder, and these are often markedly pedunculated. The small elevations of the mucosa contain ova in large numbers; they occur chiefly in the submucous layer, and their presence tends to produce connective tissue formation, as is the case with any foreign body. The new growths are said occasionally to undergo malignant change, so that the disease must be regarded as causing a predisposition to malignancy. Other organs may also become invaded, notably the seminal vesicles, vagina, uterus and rectum; but this is rather un-

usual. In very exceptional instances even the viscera of the thorax have been involved.

Diagnosis is readily made by finding the ova in the urine. Examination with the cystoscope may yield valuable information as to the severity of the infection, and the extent of the damage wrought.

The prognosis, according to all writers on the subject, is that of a very chronic cystitis, which is not fatal *per se*, but may become so through some complication. The smaller the number of worms present, the better the outlook, for obviously these cannot multiply within the human host. Those already present, however, may live for many years and continue to cause symptoms. Removal of the patient from the district in which the disease prevails will prevent reinfection and offer a better chance for eventual riddance of the worms.

Treatment must necessarily be essentially symptomatic, the chief object being to prevent some serious complication. It would appear that nothing could be administered to kill the parasite within the blood-vessels without harm to the patient, although good results have recently been reported by the use of emetin intravenously.¹ The general condition of the patient must be looked after, new growths removed, fistulas repaired, ulcerations remedied so far as possible, &c. In the medical treatment many remedies have been tried, but without much success. The hope is that the parent worms may finally die, and thus the extrusion of the ova cease.

Prevention can be effected by avoiding contact with water in endemic districts that has not been rendered free from cercariae by boiling or by some chemical agent. These are able to live only forty-eight hours after being discharged from the snail, but a snail may remain infective over a long period and continue to give off cercariae. Preventing excreta from coming in contact with fresh water would also be effectual, but this, of course, is a hard matter to control. It is said that the cercariae are able to pass through the ordinary municipal filter bed without difficulty, but are easily killed by most of the ordinary germicides used in water purification.

REPORT OF A CASE.

History.—M. G., a Russian Jew, aged 31, single, presented himself in October, 1918, for examination. He had been born in Russia near Moscow, and had left Russia in 1914 for Palestine, where he remained about a year, leaving there for Egypt early in 1915. He remained in Egypt near Cairo for about a year, during which time he was engaged in farm labour, principally at digging irrigation ditches. He worked barefooted, often standing in water up to his knees or waist. After he had been engaged in this work for about one month he noticed that his urine was no longer clear, and that he had hæmaturia. He was warned to leave the

country at this time, but remained eleven months longer, and then left for America.

Since first observing the blood he had a marked terminal hæmaturia which he thought had neither abated nor become more intense, although he had observed that the early morning urine contained less blood than at other times during the day. Subjectively, since the beginning, he suffered a slight pain and burning sensation along the urethra, especially near the external meatus, that would last for about five minutes after each micturition. At the onset he was also troubled with great frequency, having to urinate about every half hour; the latter symptom had greatly abated, so that he now had a binocturia with only slightly or no increased frequency during the day. He also stated that during the time he remained in Egypt he lost about 25 lb. in weight, which he had not been able to regain; that his general health had not been so good as formerly; that he now became tired very easily, and that all sexual desire was lost. His present occupation was that of shipping clerk in a laundry.

Examination.—Observation disclosed that about 5 c.c. of what appeared to be pure blood were passed at the end of urination, and microscopic examination confirmed the presence of a large amount of blood besides large numbers of the ova of the *S. hematobium* of Bilharz. These were very typical in appearance, having a terminal spine, and it is interesting to note, from a biologic standpoint, that in a large number of examinations, during which hundreds of ova were seen, not one with a lateral or subterminable spine was found.

An attempt was made to rupture the enveloping capsule and set the miracidium free by diluting the urine with fresh water. This proved successful, one ovum being observed during the process. The rupture was sudden and complete.

A blood examination revealed: hæmoglobin (by Sahli method), 100 per cent.; erythrocytes, 4,344,000; colour index, 1.16; leucocytes, 8,400; differential count of leucocytes: neutrophils, 56 per cent.; lymphocytes, 43 per cent.; basophiles, 1 per cent. Contrary to expectations, no eosinophiles were found in this examination even after prolonged search. Subsequent examinations, however, revealed an eosinophilia ranging around 6 and 7 per cent. No change of any significance was seen in the other elements.

Chemical examination revealed: urea nitrogen, 17.2; uric acid 2.5, and creatinin 2.3 mg. per 100 c.c. of blood, which would indicate that the kidneys either were not involved, or were at least still able to carry on normal functional activity. The blood sugar was 0.13 per cent.

October 22 a cystoscopic examination showed the trigon and ureteral orifices were pale and apparently normal; the right lateral wall had several herpetic areas consisting of yellowish white, pin-head-sized spots in clusters, surrounded by a red areola; in some of these areas the white elevations were nearly spherical, as if ready to erupt. On the posterior aspect of the bladder mucosa were

¹ Lemierre, A., and Lantuéjoul, P.: "Un cas de bilharziose vésicale traitée par les injections intraveineuses de chlorhydrate d'émétine." *Bull. et mém. Soc. méd. d. Hôp. de Paris*, June 21, 1918, p. 649.

seen carcinomatous-like elevations, ragged and red, one of which was pedunculated and spherical, of about the size of a hazel-nut. Several of these masses were present in herpes-like patches.

Since *S. hamatobium* is said occasionally to invade other organisms of the abdomen and pelvis besides the bladder, an examination of the faeces was made for evidence of intestinal involvement. The benzidin test for occult blood was very strongly positive, and careful search with the microscope showed a complete absence of eggs of the schistosomum. Hookworm eggs, however, were present in quite large numbers. It seems most probable to suppose that the latter disease was also contracted during the patient's stay in Egypt. In several instances living hookworm embryos were observed within the egg capsules, and incubation for twenty-four hours caused a rupture of the capsule and emergence of the embryo, so that after incubation the living embryos could easily be found in the stool.

Treatment and Result.—Treatment of the case consisted chiefly of bladder irrigations with argyrol and silver nitrate. Hematuria was lessened, and the patient was discharged October 31, the general condition being considerably improved.

Abstract.

SCURVY AND CONSTIPATION.¹

McCOLLUM was unable to maintain guinea-pigs—the classic animal for the study of experimental scurvy—in health on a diet of oats and milk, from which he asserts that nothing is lacking for the adequate nutrition of rats and swine. McCollum believes that the physical texture rather than the chemical make-up of the scorbutic diet must be at fault. As he develops his view, the guinea-pig ordinarily thrives only on diets that contain a succulent vegetable, since its caecum becomes packed with faeces on diets that are unsuited to its digestive tract. The caecum in this species is very large and delicate, and such a constipating diet as oats and milk causes malnutrition because of the physical properties of the faeces that are formed from it, rather than because of a lack of any antiscorbutic substance.

The investigations of Cohen and Mendel at Yale University are in harmony with the belief that intestinal stasis is the sole predisposing factor in the production of scurvy or that the action of well-known antiscorbutics can be explained as due to their laxative effects. For example, in the case of certain selected diets a small amount of milk ingested daily permitted the onset of symptoms of scurvy, while larger quantities, which were not less constipating, caused the scorbutic symptoms to disappear. Moreover, aids to the ready elimina-

tion of faeces, like differing amounts and kinds of roughage, caused no corresponding change in the course of the disease. The Yale investigators conclude that roughage in the diet plays, if anything, a minor accessory rôle in the prevention of scurvy. This disease is not essentially dependent on constipation as a causative factor, though the latter may aggravate the symptoms.

Hess has expressed himself in a similar vein:

"Observations of many cases of infantile scurvy have convinced us that constipation plays no essential rôle in this disease. In reviewing the many cases that we have seen we find that the infants were not constipated to a greater degree than normal babies, and that the disorder bore no parallel relationship to the activity of the bowels. Furthermore, as brought out in a recent paper, potato, which is a sovereign remedy for scurvy, is not a laxative, and malt soup preparations, which most readily lead to this disorder, are rather laxative than constipating. To this evidence may be added a recent experience that infantile scurvy does not yield to treatment by liquid petrolatum, but that its symptoms are rapidly alleviated by small additions of orange juice to the dietary, so small as to be without apparent effect on the bowels."

The accord between the English investigators, Click, Hunne and Skelton, and the American workers just quoted serves to keep scurvy for the present in the domain of diseases due to deficiencies of nutrition, and gives renewed significance to the careful study of antiscorbutic agents. For, as Hess has remarked, if the protective or curative values of antiscorbutic foods are, as McCollum has recently contended, merely dependent on their laxative properties, and interchangeable with laxatives, such as liquid petrolatum or phenolphthalein, then scurvy is in no sense whatsoever due to food deficiency.

Review.

CATALOGUE OF LEWIS'S MEDICAL AND SCIENTIFIC CIRCULATING LIBRARY. Including a classified index of subjects with the names of those authors who have treated upon them. Second edition. Revised to end of 1917. Pp. 492. Deny 8vo. Price 12s. 6d. net. To subscribers 6s. net. London: Lewis.

Three hundred and seventy pages are occupied with the list of authors, the names of the books they have published, with the date of publication, as well as their size and prices of the books. The classified index of subjects with the names of those authors who have treated of them occupies 122 pages.

The index includes all the books published in the English language, and is indispensable to every library where there are English and American books. In fact, it is the librarian's manual of Anglo-Saxon medical and scientific literature, and will be a useful aid to bring the literature to the notice of the Allied nations.

¹ Abstracted from the *Journ. Amer. Med. Assoc.*, December 21, 1918.

Original Communications.

A MODEL MINING VILLAGE IN THE TROPICS.

By WALTER E. MASTERS, M.D., M.R.C.S., L.R.C.P.

PRESTEA mining village is situated in the Gold Coast Colony, 59 miles or five hours along the Gold Coast Railway into the interior from Secodee. Its elevation is 200 ft. above sea-level. This village has sprung into existence during the past nine

water, rejected from the mining processes, which does not permit of the development of insect life.

The climate is moist and steamy except during the midday period. The annual rainfall is 67.0 in. The moist steamy nature of the atmosphere predisposes largely to the chest diseases so prevalent here.

The village of Prestea is built along one long valley with a main avenue 200 ft. broad. The main streets are 30 ft. and the lanes 15 ft. wide.



Prestea Model Mining Village, Gold Coast.

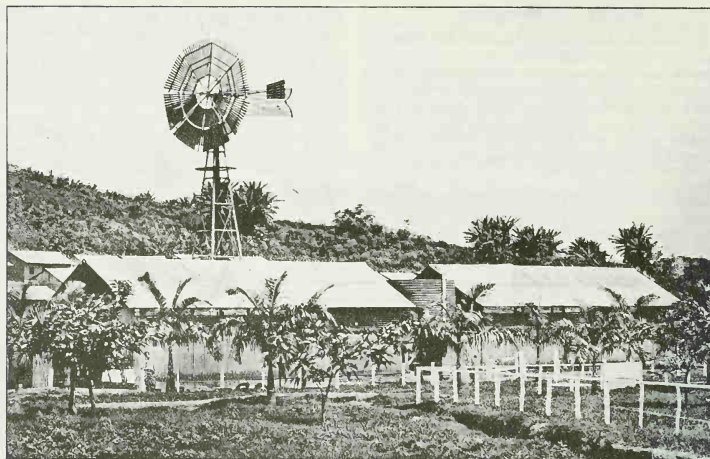
years, has a population of 12,000, and with adjoining villages within a radius of one mile, 20,000 inhabitants.

Prestea mining village is of interest because of the high standard of sanitation maintained and the rarity or absence of tropical diseases commonly prevalent on the West Coast of Africa.

The country is very hilly and rocky, hence lends itself to swampy "pockets," prolific insect breeding and consequent insect-borne diseases. To overcome these difficulties some of the swampy areas have been filled in, others straightened out or cleaned to make good definite water channels, and the larger areas have been flooded with cyanide

At intervals of ten houses there are streets intersecting at right angles, 30-60 ft. wide. All the streets are named and the houses numbered. The main streets are so situated that they receive the prevailing breezes.

The latrine system consists of twelve lime-washed concrete and iron houses, roofed and protected from the rains and situated at convenient points about the village. Each latrine house contains from 12 to 16 pans and a central clearing chamber. They are well ventilated and kept very clean. One side of the latrine house is divided off for males and the other for females. The floor is of cement, sloping from all sides to a central pit, which is

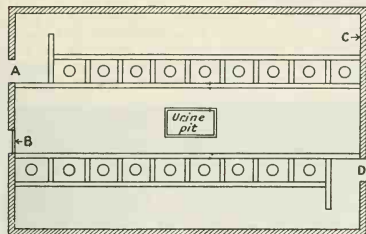


Prestea Village, Gold Coast. Native wash-houses and windmill pump.



Prestea Village, Gold Coast. Main avenue, showing rail track leading to incinerator. The central water tanks can also be seen.

shut off from the rest of the house. For the faecal material galvanized pails or discarded paint drums are used. The pails and urine pits are emptied daily from the central area of the house as shown in the diagram.



GROUND DIAGRAM OF NATIVE LATRINE.

A—Female entrance. B—Entrance for removing pails and contents of urine pit. C—Corrugated iron, linewashed. D—Male entrance.

For the ultimate disposal of faecal refuse large deep pits are dug 25 ft. deep with narrow openings into which the night soil is dumped and buried. No nuisance arises. The latrine boys are chosen from different tribes, which leads to more harmonious working.

The water supply has a beautiful pure spring source among the rocks. The front of the fall is cemented and the whole protected from pollution. There are no habitations or live stock on the catchment area and the risks of pollution are extremely small. The water is pumped along lead-lined pipes set in concrete which conduct the water behind a small dam with an opening into an underground reservoir. This is well protected and the chances of pollution are small, the whole being fenced in. A pipe track is laid to the two central tanks of supply in the village, the pipe track having a natural fall of 16 ft. The tanks are calculated to hold a day's supply. No water receptacles are permitted about the houses. The natives draw water from the central tanks as required or from the various pipe-taps situated at prominent points of the village. The neighbourhood of the pipe-taps is well cemented and drained, no water residue remaining to facilitate insect breeding.

The drainage is all that could be desired. The main drains are open cement or concrete channels; the smaller ones are lined with stone or shale. All the drains are periodically cleaned out.

The wash-houses are an important feature. There are two large bath-houses of 16 cubicles each, built of painted corrugated iron, protected from the rains and provided with a good water supply. This is obtained from a well and pumped up by means of a windmill pump. The floors of the bath-houses are cemented. The shower-bath principle is

adopted. The residual soapy water is run over several flat cemented surfaces exposing it to the sun's rays and then allowed to run along the main drain, which also carries a current of fresh water. No nuisance is created. Separate places for the sexes are provided. The natives much appreciate these wash-houses, especially when they come up from the mine.

Household refuse and other combustible rubbish is collected daily and carried away in wagons along a light railway to an incinerator situated on the outskirts of the village. This destructor is one of a good type with two furnaces. It requires a few pieces of wood to commence combustion, but at other times it carries on by its own refuse. There are 5,400 wagon loads of rubbish burned annually. The incinerator is very efficient.

The native markets are quite up to date. In order to prevent the widely distributed accumulation of rubbish so common about native markets there are four large sheds provided, one each for butchers, fish sellers, vegetable sellers and dry goods. They have cement floors and the whole is well drained. These are cleaned out daily. There is always ample animal and vegetable food available in the market. A small rent is charged for the hire of stalls.

The housing scheme is simple. The principal unit is a house of four ceiled rooms and a verandah. The houses are four feet apart. The materials are wood and "swish" with corrugated iron roofs. The rooms are fairly large and well ventilated. The better class houses are all iron, wood lined internally and ceiled, with cement floors.

Slaughter houses are provided for the slaughter of animals. Their cleanliness is controlled by the village master and the medical officer of health. Cattle do not thrive in this neighbourhood, but they are brought down from Coomassie by rail and slaughtered here as required. Pigs, sheep and goats are also slaughtered here, the carcasses of which are inspected from time to time by the medical officer.

The hospital accommodation is small but efficient and ample. The native hospital has 14 beds with operating theatre and dispensary. It is a large, well-ventilated building. The whole is fenced in and well drained. A quarter of a mile away are two small houses used for infectious cases.

GENERAL SANITATION AND ADMINISTRATION.

The whole of the village is under the superintendency of the village master, who is in turn under the supervision of the medical officer for matters medical and sanitary, and under the general manager for matters administrative.

The village master has a sanitary inspector and a sanitary gang of 70 to 100 boys, who keep down the surrounding bush and maintain the whole sanitation of the place.

All workmen of the mine are provided with free quarters, but they may have a better class residence

erected for them by the company upon their agreeing to pay rent in proportion to the cost of the house. Electric light is supplied at a nominal fee to those desiring it.

The natives pay one penny per working day for all the privileges of sanitation and hygiene.

THE GENERAL HEALTH.

The native people are strong, well nourished, hard working, and often clever artisans. Some of them earn as much as 7s. 6d. daily, while the

their houses, so that phthisis and other respiratory diseases spread rapidly.

Those diseases due to lack of general outdoor sanitation, so prevalent on the Gold Coast, are almost absent here, thanks to the excellent sanitation maintained.

Intestinal and insect-borne diseases have been almost wiped out by the introduction and maintenance of sanitary measures, especially of the water supply and the public latrine system. Yellow fever, trypanosomiasis, dysentery, cholera, typhoid



Prestea Village, Gold Coast. A group of the natives.

crudest labourer receives 1s. 6d. per diem. There are about 6,000 employed by the mine.

The mortality is 17.2 per thousand, nearly all of which is due to respiratory diseases, such as pneumonia, tuberculosis and pneumonias. This latter (miner's phthisis) is present but rare. 600 natives perished from the village during one month of the influenza epidemic last November. Some of the natives then attacked have been left with a very intractable asthmatic condition. The respiratory diseases can well be accounted for by the constant damp moist atmosphere, cold nights and the very hot middays. The natives do not believe in exposing themselves to any fresh air while in

fever and malaria can be claimed to be almost non-existent. The spleen rate is practically nil. Not 1 per cent. of the in-patients of the native hospital are admitted for malarial fever. A few mosquitoes exist but they do not abound. Ankylostomiasis is not at all widely spread. Kala-azar, plague and schistosomiasis have never been prevalent in these parts as far as can be ascertained.

CONCLUSION.

This brief survey indicates what can be done by sanitation and hygiene in a country once known as "The White Man's Grave." Next to the world wonder of Panama the writer has not seen such

good results anywhere at so little maintenance expense as at Prestea Model Mining Village, Gold Coast Colony, and because of this felt justified in writing these notes.

The writer is indebted to the general manager, C. Beresford, Esq., for permission to publish this sketch.

A CASE OF BILHARZIAL DISEASE TREATED BY INTRAVENOUS INJECTIONS OF ANTIMONIUM TARTARATUM.

By GEORGE C. LOW, M.A., M.D., C.M., M.R.C.P.

Physician, Albert Dock Hospital, London School of Tropical Medicine, Temp. Major I.M.S.

FOLLOWING the method of treatment first proposed by Christopherson¹, and also used later by Wiley², I have just completed the treatment of a case of mild bilharzial disease by intravenous injections of tartar emetic with successful results.

to England and joined the R.A.S.C. With his unit he went to Egypt in 1916. Then on to Salonika, then back to France in 1917. He was invalided from there in May, 1918, for bilharzial disease.

BILHARZIAL HISTORY.

Got bilharzial disease first in 1905 in Natal. Very bad, passed much blood, mostly clots. Different remedies tried, male fern doing it some good. Finally the blood disappeared and the symptoms quietened down, and then also disappeared. Though his energy was defective still, the infection did not trouble him, and possibly he had really thrown it off, though this is doubtful. After this he had no further symptoms, at any rate, till Salonika, three months after leaving Egypt. Blood then began to appear in the urine occasionally, with some pain in the back. This did not incapacitate him, however, and he was passed fit for

RECORD OF ANTIMONIUM TARTARATUM INJECTIONS.

1919		Remarks	Ova
March	1	...	Nil.
"	3	...	"
"	4	...	Plus B.
"	5	...	"
"	6	Ant. tartaratum gr. $\frac{1}{2}$ i.v.	"
"	7	...	"
"	8	...	Plus.
"	10	Ant. tartaratum gr. $\frac{1}{2}$ i.v.	"
"	11	...	Plus B.
"	12	...	Plus.
"	13	Ant. tartaratum gr. $\frac{1}{2}$ i.v.	Nil.
"	14	...	Plus B.
"	15	...	Plus.
"	17	Ant. tartaratum gr. 1 i.v.	Plus B.
"	18	...	"
"	19	...	"
"	20	...	"
"	21	Ant. tartaratum gr. 1 i.v.	Plus.
"	22	...	"
"	24	Ant. tartaratum gr. 1 i.v.	"
"	26	...	Nil.
"	27	...	Nil C.
"	28	Ant. tartaratum gr. $1\frac{1}{2}$ i.v.	Plus 1 egg.
"	29	...	Nil C.
"	31	Ant. tartaratum gr. $1\frac{1}{2}$ i.v.	Plus 2 eggs in 5 specimens. C.
April	1	...	Nil C.
"	2	...	"
"	3	Ant. tartaratum gr. 2 i.v.	"
"	7	Ant. tartaratum gr. 2 i.v.	Plus 1 egg dead. 3 specimens. C.
"	8	...	Nil C.
"	10	Ant. tartaratum gr. 2 i.v.	"
"	11	...	"
"	14	Ant. tartaratum gr. 2 i.v.	"
"	15	...	"
		Total gr. $15\frac{1}{2}$	
"	17	...	"
"	24	...	"
May	1	...	"

B = Blood. C = Centrifuged specimen. i.v. = Intravenously.

The history of the case is as follows:—Patient was born in Natal (1890), and lived there all his life till the war broke out. He then came

General Service in France. Here, however, under the strain of hard work, the symptoms got steadily worse, and he had to be invalided home to England.

Examination.—A well-developed adult, 29 years of age.

At the end of micturition, by straining a little

¹ Brit. Med. Journ., December 14, 1918.

² Ibid., December 28, 1918.

to exude the last drops of urine, blood would appear with a fair number of terminal-spined bilharzia eggs.

The following table gives the result of the examinations and treatment at a glance. At first the ova could easily be detected in the sediment of the last drops. When they began to disappear, then centrifuged specimens were always made.

The blood disappeared first on March 18, then it became very difficult to find any eggs. Centrifuged specimens were ultimately examined, four or five of these each time, before giving a negative result. The injections were stopped after 15½ gr. in all had been given, as the patient then began to complain of a constricted feeling over the heart after the 2-gr. injections. As he appeared to be cured there did not seem to be any object in going on giving more. The good results claimed by Christopherson are thus borne out in this case, and it will be interesting to follow the case up as long as possible to determine if the results are permanent or only temporary. As far as one can judge then at present the antimony seems to have a toxic effect upon the bilharzial adults and possibly kills them, and so brings the infection to an end. More work is, of course, required to prove this definitely, and the cases will have to be followed up over long periods of time in some country where reinfections are impossible.

An interesting point about this case is that when he came into hospital before treatment his eosinophiles numbered 9 per cent., while on April 17, after the completion of the course of antimony, they were still high—12 per cent.

The Association of Rickettsia with Trench Fever (J. A. Arkwright, A. Bacot, and F. Martin Duncan, *Journal of Hygiene*, April, 1919).—These parasites, found in typhus and trench fever, and the lice that transmit them, are allied to the parasites found in Rocky Mountain spotted fever and in the transmitting tick; and are also allied to parasites found in sheep tick, a species not known to be associated with any mammalian disease.

Rickettsia are not found in lice fed on healthy civilians in England. Final proof is lacking that they are the cause of trench fever because they cannot be cultivated on artificial media; their appearance suggests that they are bacteria.

Vesical Calculus of Unusual Size. G. Santos exhibited before the Manila Medical Society (*Philippine Journal of Science*, November, 1918) a stone weighing over 700 grm., evidently of rapid formation. R. Padua pointed out that the observations of Osborne and Mendel on rats indicate an association of dietetic deficiency with the formation of phosphatic urinary calculi. The Filipino diet is essentially insufficient and limited, particularly from its avitamine nature. Investigations show a relation between inadequate and deficient diet of the Filipinos and the incidence of phosphates, in contrast with the predominance of uric acid and urate calculi elsewhere.

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THE JOURNAL OF

Tropical Medicine and Hygiene

MAY 15, 1919.

A LAYMAN OF HIGH STANDING AS CHAIRMAN.

THERE is hardly an undertaking of any moment in any branch of scientific investigation, of public health, of sanitation, of epidemiology, or of an outbreak of widespread disease in which the above legend, "A layman of high standing as chairman," is not stipulated.

One of the latest instances is gathered from the contents of the Imperial War Conference Blue Book [Cd. 9177], in which is included a short memorandum on the Imperial Bureau of Mycology which, on the recommendation of the Colonial Office, the Conference decided to establish for the purpose of supplementing the work of the Imperial Bureau of Entomology. The latter Bureau was the outcome of a movement set on foot ten years ago to provide more effectively for "the control of the insect pests which are the source of so much injury to agriculture and to men and animals in the overseas possessions." The Entomological Bureau is administered by a committee of distinguished experts, and its activities are described as being manifold. One feature of its work is the identification of insects sent by collectors from all parts of the world.

It is added in this memorandum that, "as in the case of the Bureau of Entomology, there is to be a committee of competent experts and Dominion representatives with a layman of high standing as chairman." By a layman we understand that he is a man who is not an authority on fungoid disease, on plant diseases, on entomology, plant breeding, or of any one of the many branches of the subjects with which these committees deal. It is a peculiar rider this "layman as chairman," a peculiarity which is eminently British, and one which has prevailed in British scientific matters ever since we can remember. Why a layman in the chair? Well, it is the custom, it is a tradition, and therefore not to be lightly set aside. There must be a layman at the head of a committee of the kind to—to what—well, to be in conformity with tradition. When plague broke out in Hong-Kong, was a doctor put in charge of the procedure for combating the disease? No; a layman, a Government servant, was the chairman, and the doctor admitted only to report what he was doing. When plague broke out in Bombay, was the head of the medical service put in charge? No; a soldier—General Gatacre. When the old National Aid Society for the relief of the sick and wounded in war—now the British Red Cross Society—thought of investigating the necessity for medical and surgical help to be sent to any part of the world, be it Turkey, Serbia, the Sudan, Mesopotamia, or elsewhere, a layman, not a doctor, was sent out, and if in his opinion doctors were wanted, he, the layman, dictated how many doctors were wanted, how many nurses, how much equipment was required, &c., and the whole of the subsequent work of the medical mission was under his surveillance and control. This lay chairman of the Bureau of Mycology is in accordance with British custom and tradition and must go on.

It may be it is the best plan so to do; but it also implies that no doctor is capable of acting as commissioner to investigate the necessity for medical help in war, nor to take the chair of a scientific investigation committee to which experts are convened.

It is well to remember and record that these are not the steps always taken by other countries. When Colonel Gorgas was sent to investigate the hygienic conditions required to render the proposed track of the Panama Canal sanitary no layman was employed; the doctor was given supreme control of the measures to be adopted, and supplied at his dictation with the means by which these measures were to be carried out. The thoroughness and complete success which accompanied and followed the doctor's work has not altered the customary and traditional habit of the British Government, for a layman is still appointed chairman of this the most recently formed scientific committee.

Are there no examples of medical men being capable of filling posts of the kind in which directing abilities, organizing powers and fitness for the post of chairman of great public bodies are to be recorded? Sir William J. Collins, a doctor, was elected Chairman of the London County Council, a post requiring statesmanship and diplomatic ability of the highest order. We had lately a doctor filling the post of Lord Mayor of London, and throughout the country we find medical men being chosen as mayor of the town they reside in, and at the present moment we find a doctor occupying the position of Sheriff of London, and yet another a minister of the Crown in a position demanding business and parliamentary abilities of a high order. Sir William McGregor became Governor of the Crown Colony in which he practised his profession, and, although a medical man, was appointed to the governorship of several of our most important colonies. It may be said these are the exceptions, but we may not all agree with that opinion and hold the belief that the medical profession have produced many men, especially in the Medical Department of the Army, who have confirmed us in the impression that in proportion to their numbers they equal other sections of the community in their powers of directing, ruling, and managing groups of men gathered to deal with public matters.

What is the reason for this continued and continual "suppression" of medical men? That it is a suppression, consciously or unconsciously carried on, is undoubted. It comes as an inheritance that the doctor is to be treated as a servant, a man to be paid in shillings for his services, and dismissed when he displeases. Give him his half-crown or whatever it is and let him go. Society folks asked each other: "Do you shake hands with your doctor?" "Oh, no; I should not think of such a thing." And in all groups of the community the doctor, being at everyone's beck and call, it is ridiculous that he should take up public affairs or become even a member of the Board of Guardians, far less a chairman, a mayor, or fulfil any position of a public nature.

When Gorgas said that he was to be his own master and to carry out the schemes he thought fit, it was a great shock to the world generally when

he said he would be responsible to no underling of State, but to the supreme head only. What! pills and bottle of medicine talking like this; it must be seen to.

All these phases of grading and suppression have been fought out by our medical brethren in the Army. Fifty years ago the doctor held but a relative rank; he was not considered fit to be a commissioned regular officer; no soldier was bound to salute him, to obey his commands, or in any way to heed his instructions. Gradually and by a bitter fight the social position of the soldier doctor has been fought out, but the old sting, although dormant, is still shown in indirect ways. Certain clubs and messes show the cloven hoof still, and the "layman of high standing as chairman" is a relic of prejudice which is not yet dead. What about the future? Are civilian medical men all to become Government servants? or, on the other hand, are they to form a trades union and do as other trades unions do—fight the authorities, strike, slack in their work; defend the most stupid amongst them, and see to it that he shall not be prosecuted when through *malpraxis* his patient suffers; curtail hours of work and "down tools" in the midst of a prolonged labour? The parallel is too absurd. But—in that way degradation lies. The moment the State gets a hold of him, the Gorgas spirit is quashed. The lay chairman of high standing will continue, and the thralldom will become complete. Far different was the view of Disraeli and Gladstone. The former regarded the future as sanitation. All is sanitation in accordance with the law of Mosaic times. Gladstone heralded the future as being in the hands of the medical profession, and the doctor as the dictator of policy. In their present time distress, let the medical profession see to it that their birthright, their future, their self-respect is not bargained away, but that they keep their heads up, and not allow any layman to interfere with matters of which he knows nothing, and dictate to them along what lines they are to direct their efforts or to allow them to reap the rewards which are justly theirs.

After all this tirade, extreme in many points, but yet more than flavoured with a *souçon* of truth, are we better as we are? The layman of high standing as a rule makes an excellent chairman; he is just, willing to listen to both sides of any discussion, having no prejudices, a restraining hand on extreme measures—on expenses, in range of work, &c., a practical man introducing the diplomatic or commercial element to the scientific men assembled, and seeing to it that the issue of expenditure is likely to be of monetary or hygienic value to the State. All this we admit, but it is well to keep before us the fact that he is there as a tradition, and as a reminder that the doctors are still sitting there under that tradition of inferiority, be the advantages what they may.

Review.

ELEMENTS OF SURGICAL DIAGNOSIS. By Sir Alfred Pearce Gould, K.C.V.O., and Eric Pearce Gould. Pp. 722 + xiv. London: Cassell and Co. 1919. 12s. 6d. net.

It is a pleasure to read a new edition of a standard text-book known to so many generations of students. The book was originally published in 1884, and still after thirty-five years embodies the ripe experience of its first author as well as of younger men. The first six chapters deal with the general principles of diagnosis, wounds and their complications. Seven chapters are devoted to swellings and tumours, to ulcers, fistula and gangrene. The rest of the book comprises the regional consideration of injuries and diseases, all embodying the results of war experience. Some chapters have been compressed, an indication that in some respects recent discoveries have simplified the work of students and teachers. For the good of everyone, further simplification of teaching is possible, if only teachers would co-ordinate by informing themselves of work done by and the teaching of others. For this reason the work will be found a great help to all engaged in teaching students of medicine and surgery to plan their teaching to conform with needs of practical surgery, and what perhaps is more important, the borderland of medicine and surgery. To students the work is as necessary as ever.

DIETETIC PREPARATION.

SPEAKING at the annual meeting of the Bovril Company, Sir James Crichton-Browne, M.D., F.R.S., said:—

"Any mask that could be worn would be no more efficacious than would be the erection of a barbed wire fence to shut out the flies. The best precautionary measure is the maintenance of good sound bodily health.

"It is a matter of deep regret that during the recent visitation of influenza there should have been, through the shortage of bottles, a dearth of Bovril. But the visitation is not yet over.

"Its past history suggests that influenza epidemics come in three great waves. Two of these waves have swept over us with dire results, and the third wave seems now to be gathering force and advancing with its death-dealing concomitants, pneumonia, meningitis, and heart failure. It is to be hoped that during the third wave more copious supplies of Bovril may become available. It has a great protection against influenza. We have scriptural authority for believing that if you resist the devil he will flee from you, and that is true of the fiend—influenza. We must strengthen our resistance against his attacks. We have as yet no specific remedy, and it is better to keep him at arm's length than to wrestle with him after he has got a grip of us and has invaded our system. Well, Bovril will assist us to do that. It supplies readily assimilable nourishment, invigorates, fortifies and supports, especially during exposure and exhaustion, and so heightens our power of resistance to the disease.

"We have the testimony of all our leading Generals that Bovril has proved an inestimable boon and comfort to our men in the trenches, in the field, and on the march, and notable as were its services during the war, they are certain to be no less signal now that Peace is declared. Bovril is a great reconstructor, and will help to steady, recuperate, and build up again those whose nerves, in the words of the Prime Minister, 'have been rattled' during the war."

Original Communications.

SUDANESE EXAMPLES OF TWO COMMON HYPERKERATOSES.

(II) PITYRIASIS RUBRA PILARIS.

By ALBERT J. CHALMERS, M.D., F.R.C.S., D.P.H.

Director, Wellcome Tropical Research Laboratories,

AND

Captain ARTHUR INNES, R.A.M.C.(T.)

Attached the Egyptian Army, Khartoum.

CONTENTS.—Introductory — Historical — Clinical Description — Pathological Anatomy — Etiology — Pathology — Classification — Diagnosis — Treatment — Summary — References — Illustrations.

Introductory.—This paper is the fifth of a series of short notes published in this Journal and dealing with the subject of *Hyperkeratosis* as seen in the Sudan, and details the history and inquiry into a case of *Pityriasis rubra pilaris*.

Historical.—In the year 1828, Tarral, of Bartholomew's Hospital came across a curious case of skin disease in a man, named James Shooter, aged 29, who, at the age of 18 years, had been attacked with a skin disease, of which the principal features were:—

1. Head covered with white scales.
2. The skin of the face hard, thickened and rigid.
3. The neck and chest covered with scales and very red.
4. Small isolated, rounded, squamous asperities on the dorsal aspects of the first phalanges of the fingers. Each of these asperities is pierced at the centre by a hair. These asperities are seen to be formed of an agglomeration of scales around the hair.
5. The same appearance as in (4) is seen on the arms but to a less degree.

Tarral sent an account of this case, which apparently resembled in most details the Sudanese case which we are about to record, to Rayer, who published it on page 158 of vol. ii of the second edition of his "Maladies de la Peau," under the heading of a general psoriasis characterized by desquamation on the parts occupied by the hairs.

In 1854, Devergie observed another case in Paris, and gathering together two other cases in addition to that described by Tarral gave it the name *Pityriasis pilaris*, but he unfortunately looked upon the symptoms which he called *Pityriasis capitis*, *Psoriasis palmaris* and *Pityriasis rubra* as preceding the disease and not as symptoms thereof. His account is to be found in the second edition of his "Maladies de la Peau," which appeared in 1857.

Lichen Ruber.—In 1860, Hebra, unacquainted with the foregoing observations, described a complaint under the heading *Lichen Ruber* in the first edition of his work on "Diseases of the Skin," which formed part of Virchow's "Handbuch der Speciellen Pathologie und Therapie," and which forms the basis of the Sydenham Society's Translation of his works.

The eruption consisted of scaly miliary papules

which are at first distinct from one another and which remain of the same size throughout the whole of their existence and never undergo peripheral growth, but, as the new papules may spring up at a distance from the original site or in the intervals of sound skin between given papules, patches may be formed of papules closely aggregated together.

There was, however, one marked difference between Hebra's patients and the earlier cases, and this was that of the former all but one died from the disease, while in the latter it was a relatively trivial affection, but one of Hebra's earlier cases recovered and afterwards the type changed and the disease ceased to be fatal, which is an important point for the reader to bear in mind.

In 1869, Erasmus Wilson, in the *Journal of Cutaneous Medicine*, reported a large number of cases of a new disease which he called *Lichen planus*.

Apparently Hebra and Wilson must have seen points of similarity between their two diseases, because they agreed to regard them as one and the same disease.

But Hebra ceased to see severe cases like his original fourteen, and he became so convinced that he was dealing with two diseases that he agreed to his assistant, Kaposi, dividing his original *Lichen ruber* into two diseases, viz.:—

Lichen ruber planus.

Lichen ruber acuminatus.

The first was intended to agree with Erasmus Wilson's *Lichen planus*, and unfortunately the latter was believed to represent Hebra's original *Lichen ruber*, and this is the foundation for all the subsequent confusion lasting to the present day.

In the same year an acute observer like Tilbury Fox published a plate of *Lichen planus*, another of *Lichen ruber*, and a third of *Pityriasis pilaris*, and he points out that people with *Lichen ruber* are often subjects of dyspepsia, of great nervous depression, the result of anxiety, worry, overwork, or of marasmus which may increase so as to lead to a fatal result, while he considers that the reason that he, personally, had never seen a fatal termination was due to good treatment.

He is, however, very clear that *Lichen planus* and *Lichen ruber* are one and the same disease, e.g., he states:—

"The more general and severe form of the disease (*Lichen planus*) as described by Hebra under the term *L. ruber* I shall depict in Plate XIII.

"When however their experience has become as ample, or, perhaps, as fortunate as mine, they will assuredly allow my assertion is a correct one."

Our Khartoum case of acute *Lichen planus* has scaly patches of *erythrodermia* on his forehead exactly like the patches depicted by Tilbury Fox in Plate XIII under the heading *Lichen ruber*.

Tilbury Fox, however, states that there are many who do not agree that *Lichen ruber* and *Lichen planus* are two different degrees of intensity of the same disease.

We must therefore enquire more carefully into the meaning of:—

Lichen ruber acuminatus.

Lichen ruber planus.

Lichen ruber (Hebra's original cases).

Lichen ruber acuminatus.—There is no doubt at the present time as to what is meant by Kaposi's *Lichen ruber acuminatus*, for at the International Dermatological Congress held in Paris in 1889, Kaposi came to the conclusion that these two diseases were one and the same. Nevertheless, at the meeting of the Viennese Society of Dermatology, held on April 30, 1890, Hebra (junior), who held the view that *Lichen ruber acuminatus* was the same as *Lichen ruber*, showed a case which was intended to demonstrate by its clinical appearances and by its cure without arsenical treatment (*vide* same Society, May 28) that *Pityriasis rubra pilaris* was distinct from *Lichen ruber acuminatus*. The discussion on this case is interesting because both Kaposi and Neumann took part and because Hebra (junior) stated that, in his opinion, a drawing of one of his father's cases, made twenty years previously and diagnosed at the time as *Lichen ruber*, showed that that particular case was undoubtedly *Pityriasis rubra pilaris*.

Presumably at this point we ought to refer to the valuable work of the French writers, and especially to those by Roubaud and by Besnier, but unfortunately the copies we had obtained were lost before they reached the Sudan, and we are unable to discuss their writings.

The fact that *Pityriasis rubra pilaris* is the same disease as *Lichen ruber acuminatus* may be said to be settled at the International Dermatological Congress held at Vienna in 1892, when Kaposi and the French observers went to Budapest and there both parties recognized the same case as suffering from their disease.

We may therefore conclude that—

Pityriasis rubra pilaris of Devergie,
Lichen ruber acuminatus, of Kaposi,

are one and the same disease.

Lichen ruber planus.—Having come to this conclusion we must now inquire whether Devergie's disease is the same as the *Lichen planus* of Erasmus Wilson, which we have seen named *Lichen ruber planus* by Kaposi with Hebra's consent.

At this point the work of the American dermatologists makes itself felt. So far as we know, the first case of *Pityriasis rubra pilaris* to be mentioned in America was that in a patient of McMaster, of New York City. This case was carefully studied from a histological point of view by Robinson in 1883 under the name *Lichen ruber* and was compared with an American case of the *Lichen planus* of Erasmus Wilson, which was also studied microscopically, with the result that the author concluded that *Lichen ruber* and *Lichen planus* were two entirely distinct diseases and that the grounds for regarding them as but two forms of the same

disease were altogether untenable. At the moment of writing we have a well-marked case of *Lichen planus* in Khartoum, and observing this case it is difficult for us to trace any resemblance to the *Pityriasis rubra pilaris* case of the present paper. They are entirely different from a clinical point of view.

In 1889 a truly masterly account of the disease under the name *Lichen ruber* was written by Taylor, of New York. The clinical account was entirely drawn from his own observations of two cases and he remarks, with justifiable pride, that it is the first clinical description written in the English language and based upon the author's own observations and not upon the original of Hebra.

His histological work, which he states was tinged by no bias for dermatological theories, appears to us to be most excellent. He states:—

"The facts presented will, I think, convince any truth-seeking and conservative observer that *Lichen ruber* is a distinct morbid entity without a shadow of relation to *Lichen planus*."

The difference between the two diseases is accepted at the present time and we may conclude that:—

Pityriasis rubra pilaris of Devergie
is not the same disease as the

Lichen planus of Erasmus Wilson.

Lichen ruber (Hebra's original case).—We now come to the most difficult question of the series, viz., the nature of the fourteen original cases which Hebra called *Lichen ruber*, and, in order to do this, we must refer to his original description.

It is a disease characterized by:—

1. The formation of papules which remain unchanged throughout the whole course of their existence except that the subsequent springing up of fresh papules may cause them to coalesce into circumscribed patches.
2. These papules and the patches (unless, indeed, they are covered by masses of epidermis) invariably possess a marked dark-red colour and retain it under all circumstances.
3. They excite but little itching and the patient does not scratch them.
4. The papules remain of the same size throughout the whole of their existence and never undergo peripheral growth, but new ones may spring up either at spots distant from the seat of the first outbreak or in the intervals between the original papules. Thus as the disease advances the papules seem gradually to become more closely aggregated together; the intervening spaces of healthy skin at first considerable grew fewer and fewer until at last the papules come into actual contact and form continuous patches of variable size and shape, red, infiltrated and covered with scales until they occupy entire regions or even the whole surface of the body, which is universally reddened, covered with thin scales and so infiltrated that a fold of the skin is found to be twice the normal thickness and the patients have great difficulty in effecting complete flexion and extension of their joints. Fissures are formed which extend down to the corium and bleed. The nails of the fingers and the toes are affected. The hair of the head, pubes and axillae remains quite unaffected but the hairs on the trunk are never much developed.

When extensive there is a very disagreeable degree of itching.

When the patches are few, the general health is not affected, but, as the eruption increases, nutrition declines day by day, and the patient falls into a state of marked marasmus and the case generally terminates fatally after a duration of several years.

The great distinguishing feature between this disease and Devergie's *Pityriasis* is the severity of the symptoms.

But severity alone will not separate the two diseases, for example, compare the severe case reported by Graham Little to the Dermatological Society of London on June 11, 1902, in which the health of a child afflicted with Devergie's complaint had deteriorated to a marked degree and did not improve on arsenic, but was cured by thyroid treatment and soaking with glycerine. This case was so severe that Sir Malcolm Morris considered it to approximate closely to the type of *Lichen ruber*. These and many other observations of their own and other persons forced Crocker, Stelwagon, and other authorities to the conclusion that Tarral and Devergie's cases suffered from the same disease as Hebra's, and that both sets of patients were afflicted with the same disease as that named *Lichen ruber acuminatus* by Kaposi, and at this all doubt would have ceased, if it had not been for the extraordinary outbreak of an epidemic of a *Lichen* in 1881-1882 at Hamburg.

This disease was described by Unna as *Lichen neuroticus*, but, strange to say, he did not examine it histologically. Its characters were:—

1. Onset with acute general symptoms, including fever and nervous excitement.
2. The first cutaneous symptom consists of patches of erythema about the size of the palm of the hand appearing on the extremities or the thorax which have a shagreened appearance and quickly spread so as to cover large areas of the body, but rarely reach the head or face.
3. Upon these erythematous areas appear small papules produced by the action of the *Arrectores pilorum* muscles, and follow an outbreak of nervous excitement.
4. Later, follicular and non-follicular, deep red, raised, conical, shining papules appear, which may be pierced by a hair or covered by a small thin scale. These papules never alter in character, but may increase in number and so form patches around which the skin becomes swollen, inflamed and of a reddish or bluish grey colour.
5. Cases may be easily cured by sedatives, &c., at stage 3, or the later eruption may recede and form a severe *Lichen planus* type, or fresh attacks of fever may occur, with severe itching and the formation of fresh crops of papules followed by nervous irritation, loss of appetite and emaciation, this may last for months and may end in death.

If this account is compared with Hebra's it must be acknowledged that one feels that they represent respectively acute and chronic attacks of the same disease.

In 1893 von Düring published a paper entitled *Lichen*, *Lichen neuroticus* and *Pityriasis rubra pilaris*, to which we have been unable to refer, but it must have included an account of at least one patient suffering from *Lichen neuroticus*, because he sent a piece of skin to Unna upon which this

observer based his histological remarks, presently to be quoted.

To understand Unna's remarks it is necessary to know that he divided the lesions of *Lichen planus* into:—

- (1) *Elementary Lesions*, which are: (1) The Polygonal Papule, (2) the Obtuse Papule, (3) the Follicular Papule, (4) the Plane Papule.

- (11) *Synanthems*, which are: (5) The Ring-formed Papule, (6) *Lichen Patches*, (7) Erythrodermia.

Under the last heading he places *Lichen neuroticus*, and he says that the piece of skin sent to him by von Düring showed "small typical plane papules" in some sections and "isolated follicular papules" in others.

By the term Erythrodermia, as applied to this disease, he means the general redness and infiltration of the skin, which in *Lichen neuroticus* develops from the follicular papules and also the inter-follicular erythema, both of which heal with marked pigmentation.

Examined microscopically these areas showed dilatation of the vessels, slight perivascular infiltration of cells not so small as those most characteristic of *Lichen planus*, and thickening of the horny layer with a tendency to scaling.

As already stated, Unna classifies this as *Lichen planus*, and, as already mentioned, there must be features in common between Hebra's and Wilson's diseases, otherwise their discoverers would not have agreed that they were one and the same disease, but there are marked differences between the acute *Lichen neuroticus* (which is so like the chronic *Lichen ruber*) and *Lichen planus*, as has been pointed out by Brook and MacLeod, and from whose writings we have derived most of our symptoms of *Lichen neuroticus*, and these are:—

- (1) *Lichen neuroticus* begins as an acute erythema on which the acuminate papules arise. This is never seen in *Lichen planus*.
- (2) *Lichen neuroticus* leaves behind a mass of dark pigment cells in the corium, and this *Lichen planus* never does.

We may therefore conclude with Brook and MacLeod that Hebra first met with chronic cases of *Lichen neuroticus* in which the follicular papules were evident and that, when these cases ceased to appear, he recognized as his disease the more common and less severe *Pityriasis rubra pilaris*, and that the connecting link was these follicular papules. But it is evident that Hebra was not happy in his mind about these latter, as he agreed to Kaposi forming them into *Lichen ruber acuminatus*, whereas his more severe cases he kept with Erasmus Wilson's *Lichen planus*, under the name *Lichen ruber planus*, which Morris states that his own observations show to agree with Hebra's original *Lichen ruber*, while in addition he suggests that this latter complaint is the same as Unna's *Lichen neuroticus*.

Neisser has given the following points of distinction between *Pityriasis rubra pilaris* and *Lichen ruber*.

- I. *Pityriasis rubra pilaris* of Devergie: Synonym—*Lichen ruber acuminatus* of Kaposi which is characterized by:—
 1. Scarcely any alteration in the general health.
 2. Marked chronicity.
 3. Uninfluenced by arsenical therapy.
 4. Less papule formation.
 5. Shows marked hyperkeratosis.
 6. Microscopically marked epidermal increase.
 7. Little cellular increase in the corium.
- II. *Lichen ruber* of Hebra: Synonyms—*Lichen neuroticus* of Unna; *Lichen ruber acuminatus* of Neisser, which is characterized by:—
 1. Serious alteration in the general health.
 2. May be acute or chronic.
 3. Markedly benefited by large doses of arsenic.
 4. Marked papule formation.
 5. Shows less hyperkeratosis.
 6. Microscopically there is not marked epidermal increase.
 7. Distinct cellular increase in the corium.

Certainly the descriptions of Hebra's original cases of Unna's *Lichen neuroticus* do not agree with our case of *Pityriasis rubra pilaris*, nor with the straightforward case of acute *Lichen planus* of Erasmus Wilson which we have in Khartoum at the time of writing, and which makes us feel that the *Lichen ruber* of Hebra would be better called *Lichen neuroticus*, and considered as a distinct variety belonging to the *Lichen planus* group.

In coming to this conclusion, we are in accord with Brook and MacLeod in agreeing that the only possible solution is to follow observers like Hebra, von Düring, Tilbury Fox, and Morris, who have actually seen this rare disease and who all agree that it is closely related to *Lichen planus* and quite distinct from *Pityriasis rubra pilaris*.

Iconography.—Numerous illustrations of *Pityriasis rubra pilaris* exist in atlases of skin diseases, but we are acquainted with only three plates depicting it in the dark skin. One of these is to be found in Plate V, opposite page 240 of the 1916 edition of Stelwagon's treatise. This so clearly depicts the *Pityriasis* condition of the head in a mulatto girl that we have not illustrated this point as seen in our case.

The other two illustrations are to be seen in figs. 45 and 46 of Schamberg's book, and they depict the conical papules in a mulatto woman.

Tropical Cases.—Castellani saw a case of the disease in Ceylon, but this was in a European, and these cases in mulatto women appear to have been in the Northern United States.

We therefore believe our case to be the first recorded as occurring in the tropics, in the Sudan, and in an Egyptian, and it is for this reason and for the more general interest in the anatomical findings that we bring forward the following few remarks.

We would also ask our readers to remember that though *Lichen neuroticus* and *Pityriasis rubra pilaris* are rare in the temperate zone, they have to be proved to be rare in the tropics.

Clinical Description.—The patient is a young Egyptian soldier, aged 26 years, who has been eighteen months in the army and who, apart from his skin disease, is and has been in good health.

The skin eruption began by scabiness of the head followed by the eruption some six months ago on the face and arms and then by that on the body.

The whole of the scalp was covered by a dense mass of white scales matted together by the hair, and from this region a peculiar mousy odour emanated. When this mass of scales was cleaned off by means of poultices and oil it was seen that the scabiness came from the mouths of the hair follicles and was in the form of white dry scales. The skin between the follicles appeared to be normal. The scales were examined microscopically, with and without the action of reagents and stains, while cultures were made but no fungi or any other important organism could be found. The scabiness, although present all over the scalp, was most marked upon the vertex and at the sides. In front it was continuous with the inflamed area on the forehead where the scaly follicles of the scalp came into juxtaposition with the plugged follicles of the forehead. At the back of the head the scaly follicles were continuous with a patch of follicular papules (fig. 5), which were situate in skin which was not obviously red and inflamed.

We have not illustrated this scabiness, because, as already stated, it is well shown in the black skin in Stelwagon's picture.

With regard to the face (fig. 1), the hair follicles were plugged with horny cells and the surrounding skin was swollen, dark red in colour, and covered with a branny desquamation, as can be easily seen if fig. 1 is examined by means of a reading lens.

The area so affected begins at the junction of the hairy scalp with the forehead and runs down over the temples and round the cheeks as far as the nose, while the cheek areas are continued downwards and round the chin. The centrally situate nose and lips are unaffected, while the eyebrows and eyelids also escaped, as did the ears.

The tongue was whitish and white patches could be seen inside the cheeks, but there were no gastrointestinal symptoms.

The nape of the neck (fig. 5) showed a well-defined area of follicles capped by horny plugs, but the surrounding skin was quite free from redness and signs of inflammation.

The right shoulder-blade showed a small patch of plugged follicles.

The extensor surfaces of both arms, fore-arms (fig. 4), and hands (fig. 2) showed well-defined patches of plugged follicles in the form of small conical papules (fig. 3) attached to skin which showed no signs of inflammation. These papules were hard to the touch and could be imagined to feel somewhat like the proverbial nutmeg-grater, and were especially well seen on the dorsal aspects of the first phalanges of the fingers (fig. 2).

As regards the flexor aspects of the arms, patches of papules could be seen at the bends of the elbows and lower down on the fore-arms on both sides.

The palms of the hands were quite free from hyperkeratosis and no palmar papules could be detected. They were not dry but, on the contrary,

so long as we observed the patient, they were quite moist.

The nails, as can be seen from fig. 2, were quite normal. As regards the body there was a small patch of papules of the skin over the lower part of the sternum. There were a few papules on the penis.

With regard to the lower limbs, there were patches on both buttocks on the inner and outer sides of the thigh on the right. There was also a small patch on the outer side of the legs above the ankles. The soles of the feet were quite free from the disease and, like the palms of the hands, were moist. The nails, as in the hand, were normal.

The hairs in the affected regions were broken off short.

With regard to the characters of the papules themselves, these are shown in fig. 3. Each papule consists of a hard elevated conical mass of epidermal scales situate at the mouth of a hair follicle. The papule does not increase in size after full formation and does not alter in character, but new papules (fig. 3) appear between old papules, in greater and greater quantities and so form patches which on the face are situated on erythematous skin with scales. New papules appeared on various parts of the body while we observed the patient; once a series of papules were established, we observed no change.

Unfortunately we were unacquainted with "poral papule" and "sinuous papule" until we had studied the histology of this case, otherwise, surely, we should have defined, at all events, the former clinically, as papules of that nature can be seen in fig. 3.

The patient was placed in the hospital and vigorously treated with thyroid extract and alkaline baths, followed by emollient ointments, but these did no good, and, in fact, we could observe new patches appearing. Arsenic was then tried without effect, and after a time the patient was invalided from the army and sent to Egypt and we saw him no more.

Physically he remained in good health, but mentally he was much disturbed by his eruption, and the thyroid treatment only served to deepen the gloom with which he viewed his cutaneous condition and his anxiety to return to his home. He showed no active signs of tuberculosis and we were unable to obtain any history thereof. We did not try von Pirquet's cutaneous reaction.

Pathological Anatomy.—This has been studied by a number of observers whose results will be compared with our own after these have been stated.

Our studies have been confined to a piece of the erythrodermia from the face, and another of a non-erythematous papular area on the fore-arm.

It is preferable to begin with the non-erythematous section, various views of which are depicted under low magnification in figs. 6 to 10 and 15 to 19 inclusive.

Sweat Apparatus.—Commencing with the deepest layers of the corium, fig. 19 represents a sweat gland which is seen to be normal, but some glands in their superficial parts appeared to be surrounded by an increased number of connective tissue cells, which appear to be continued along the deeper parts of the ducts and to be the origin of the encircling fibrous tissue also seen around such ducts more superficially (fig. 25), while other ducts, especially in their more superficial aspect, show an encircling mass of cells (fig. 27), the origin of which we shall discuss later.

In the rete the ducts pass between the cells in apparently a normal manner, but often seem dilated in the *Stratum granulosum* (fig. 16), and in the horny layer they are surrounded by a mass of cells forming Unna's *poral papule* (figs. 7 and 16). It will be observed that these horny cells surround the mouth of the duct and do not fill it up. If now fig. 3 is carefully examined by means of a reading lens it will be seen that some of the papules have a most evident central depression which appears to be in the situation of a sweat pore and therefore some of these must represent, clinically, the microscopical poral papule, but, unfortunately, we did not realize this at the time when our patient was available otherwise we would have settled this point definitely.

It would thus appear that, at all events in this case, the *sweat apparatus was in working condition* and was not seriously affected as regards its cells by any toxic substance belonging to the disease.

Corium.—The deepest portions of the corium, as shown in our sections (fig. 19), appear to be normal, but more superficially there is a proliferation of the cells (fig. 18) in the lymph spaces which appear to be dilated (figs. 17 and 18). The cells in fig. 18 appear to be endothelial and those in fig. 17 to be derived from connective tissue cells.

Taking a bird's-eye view of the corium as a whole, as shown in figs. 6 and 7, it is noted that it contains many abnormal collections of cells situate in its more superficial layers and at times extending into the papillae.

These cells may surround sweat ducts (fig. 27), hair follicles (figs. 12 and 23), blood-vessels and peculiar epithelial downgrowths into the corium (fig. 6).

The masses are composed of an open network of cells bordering spaces (fig. 21) which are obviously lymph channels and are in connection with the dilated lymph spaces of the papillae and with the larger lymph spaces deeper in the corium.

As to the origin of the accumulation, this seems to be brought about by a combination of the dilatation of small lymph spaces and a proliferation of their endothelial cells (fig. 18) with a similar process and a proliferation of the connective tissue cells (fig. 17). Both sets of cells throw out processes from other cells and thus form an imperfect wall for these spaces (fig. 21). The cellular accumulation therefore consists of endothelial and connective tissue cells (fig. 21).

In two papillæ we have observed giant cells (figs. 20, 22, and 24).

In one of these papillæ the giant cell was situated at the apex of the papilla and the surrounding cells were relatively few, but in the other papillæ there were three giant cells with many surrounding cells apparently of the same origin as those of the cell accumulations.

The blood-vessels of the corium appeared to us to be normal and we failed to find any leucocytes or typical plasma cells.

No nerve endings were visible in our sections.

Hair Follicles.—The hair in the sections appeared to be well developed, but to be surrounded as a rule by the cellular masses mentioned above (figs. 6 and 12).

In transverse sections the body of a hair follicle, i.e., the portion below the orifices of the sebaceous glands (fig. 23), shows the following characters:—

(I) *The Dermic Coat.*—There are no signs of Kolliker's hyaline layer or of Stohr's, therefore the dermic coat is reduced to one layer, "the external," and this, instead of consisting of connective tissue, is converted into one of the lympho-cellular masses mentioned above (figs. 6 and 23).

(II) *The Epidermic Coat.*—(1) The outer sheath is distinctly "en evidence," but its cells are not normal (fig. 23).

(2) The inner root sheath (fig. 23) shows very distinctly a division into three parts:—

- (a) Henle's layer is markedly thickened and altered in character, as can be seen in fig. 23.
- (b) Huxley's layers are also thickened and altered.
- (c) The cuticle of the root sheath appears to be normal.

(III) *The Hair.*—This appears to be very small. No hairs appear cut in longitudinal section in the microscopical preparations from the fore-arm, but this defect is remedied in the sections from the face.

Fig. 12 (placed laterally) depicts a hair bulb with its surrounding cellular accumulation, the cells of which do not differ from the description given above. The bulb appears in this instance to be abnormal, the papilla is atrophied, and the formation of the hair is weak and only extends up to the cellular projection for the insertion of the *arrector pili*, but this must be an atrophied hair as many of the hairs cut transversely and obliquely are fairly well formed, but we have no sections showing their bulbs. The *arrectores pilorum* are best shown in the sections from the face (fig. 13), when they will be noted to be about normal, at all events, after comparing them with more or less normal skin sections we cannot say that they are hypertrophied.

One curious point, noted by other authors, is that none of our sections have shown a sebaceous gland.

Turning now to the mouth of the hair follicle, i.e., the portion above the orifices of the sebaceous

gland, this shows the formation of the *follicular papule of Unna* (fig. 11), which is well seen, clinically, as depicted in fig. 2.

The corium (at all events in the erythrodermatous facial area) surrounding the mouth of the follicle contains the cellular accumulation mentioned above, but the principal feature is the hypertrophy of the horny cells filling up the mouth and projecting on the surface as the *follicular papule* (fig. 11), the cells of which are continuous with those of the general hyperkeratosis. Many of these horny cells are nucleated.

Epidermis.—Mostly the cells of the *stratum germinativum* appear to be normal (figs. 16 and 26), but here and there they may be vacuolated.

In places the cell of the *rete malpighii* appear to be normal and the layer itself to be reduced in depth (fig. 26), but it is quite otherwise in certain regions. In these (figs. 6, 7, and 15) the cytoplasm of the cells has become vacuolated and the vacuoles have joined with those of the neighbouring cells to form spaces which probably contained lymph and in which loose and degenerating nuclei can be seen. In this way microscopical cavities probably filled with lymph (figs. 15, 7, and 6) are formed which lie in the rete, being bounded superficially by a few rete cells and the remains of the *stratum granulosum*, together with a dense and thickened *stratum corneum*.

There is no doubt that in places there is a certain amount of acanthosis as epidermal prolongation into the corium, can be seen in figs. 9 and 14.

The *stratum granulosum* is well "en evidence" and in places is thickened, forming about three rows of cells (fig. 26).

There is evidence of general hyperkeratosis in the thickened and dense condition of the *stratum corneum* (fig. 26), but there is also evidence of a certain amount of parakeratosis in that there are masses of nucleated cells at places in this layer.

Sinuous Papule.—It is difficult to know exactly what Unna means by his "sinuous papule," but figs. 7, 8 and 10 depict a curious state of affairs which may well be this object.

If figs. 7 or 8 are examined, it will be noted that the rete has grown outwards slightly forming a little mound and has also extended on a broad base into the corium. Associated with this growth there is naturally a folding of the *stratum corneum* forming a groove around the retal hillock, which is capped by nucleated and non-nucleated horny cells which are very hard and are damaged by the razor.

If the serial sections are run through, it will be found that the hillock begins to disappear and to form a depression (fig. 10), and this is as far as our sections go. Is this the central depression of Unna's sinuous papule? We cannot answer this definitely, but it well may be.

An early stage of a sinuous papule just above a tubercular-looking mass of cells is apparently depicted in fig. 24, which shows the superficial scale bathed in lymph (sero-fibrinous exudation).

If Unna had given an illustration of this point we could have been certain whether or not our specimens agreed with this, but certainly our sections show features which agree with his descriptions.

Erythrodermia.—This feature of the disease is exemplified by our sections taken from the face.

The general features of the disease as shown by the sweat glands, corium, cellular accumulations, hair follicles, all hold good for the face.

The points which seem to us to characterize the erythrodermia are:—

- (1) The horny layer is not so compact (fig. 9), not so thick, and contains more nucleated cells, and these are more generally diffused throughout the layer. In places it looks as though the superficial cells were being thrown off.
- (2) The *stratum granulosum*, though present, is not so much "en evidence."
- (3) Though the rete is thickened in places and has processes which extend into the corium, still the more marked feature is its thinness over certain papillae and collections of papillae, the vessels and lymphatics of which are dilated.
- (4) The presence of golden yellow pigment in the form of fine granules and masses in cells in the papillae and in the superficial layers of the corium.
- (5) The very large number and size of the cellular accumulations.

Discussion.—It is now necessary to compare our results with those of other observers, but situate in Khartoum in the year 1918 we are compelled to content ourselves with but few actual references and to mainly rely upon extracts of the original papers, and in many instances we have been unable to obtain even these.

Hebra found that the skin, as examined post mortem was pale, flabby, and devoid of fatty tissue, while it was to a greater or less extent covered with scales and the hair follicles were funnel shaped, with the apex downwards.

It must, however, be remembered that this description belongs to *Lichen ruber*, which we believe to be the same as *Lichen neuroticus*.

Neumann found that the *stratum corneum* and the rete were thickened and that there was an acanthosis with downgrowths into the corium. The papillae were shrunken and atrophied but at the periphery they were enlarged. The blood-vessels were dilated and surrounded by a cellular infiltration. The sweat orifices were filled by epidermic scales and the cells of the outer root sheaths of the hairs were increased and formed conical projections into the surrounding tissue, while the muscles of the hairs were hypertrophied.

This description more or less agrees with our specimens, though it is not clear what he means by "conical projections." Does he mean that giant projection seen in fig. 12, which we believe to be for the insertion of the arrector pili, which we do not believe to be markedly, if at all, hypertrophied.

Dziadecki noted the swollen condition of the papillae at the periphery of the papule and the edematous condition of the corium. He also draws attention to an atrophic condition in the centre of the papule.

We especially invite attention to the edema of the corium (fig. 17), and we suspect that his atrophic centre corresponds to our fig. 10 and to Unna's sinuous papule.

Kaposi merely agrees with the above mentioned descriptions.

Here should come the valuable work of Roubaud and of Jacquet, but their works were lost "en route" for Khartoum, and all we know is that Jacquet showed that the conical papule, i.e., the follicular papule, was caused by an increase in the horny cells of the epithelial lining of the mouth of the hair follicle which, blocking this structure, produced the dermal changes which were supposed to be secondary. This view we cannot support as we shall show that the essential change is in the rete.

Robinson notes the hyperkeratosis and the presence of nucleated horny cells as well as the acanthosis. He also draws attention to the dilatation of the papillary vessels and to the presence of a few lymphocytes in their neighbourhood. He also noted the filling of the mouths of the hair follicles with horny cells and the hypertrophy of the arrectores pilorum. He says that the strata granulosum and the lucidum were not as distinct as usual. The corium he considered to be normal and without edema, but the vessels were dilated and surrounded by lymph corpuscles. The sweat glands were normal.

His illustrations resemble ours, except that his *stratum corneum* is thicker than ours.

Taylor describes and figures a hypertrophy of all the layers of the epidermis with infiltration of the rete with leucocytes. He also figures the localized destruction of some of the more superficial cells of that layer, thus producing pictures not unlike our fig. 6 and the left hand side of our fig. 15. So far as we know he is the first and the only observer to draw attention to this point.

He notes the downgrowths into the corium, the thickening of the horny layer and states that the strata lucidum is thicker than normal.

He invites attention to a general slight invasion of the rete by leucocytes, a point which we have failed to see.

He observes and figures *furrows lined by degenerate epidermal cells*, which in some sections extend nearly to the dermis, and this obviously agrees with our fig. 10.

In the corium swelling and granular degeneration of the endothelium of small vessels is described and perhaps this is the same as our fig. 18, which occurs in a lymph space and not in a blood-vessel. He remarks upon the exudation of serum, of small round cells with a few larger granular cells which he thinks are degenerate fat cells, and the presence of a delicate reticulum composed partly of the adventitia of the vessels and partly of the stroma belonging to the (so-called) fat columns of Collins. Our interpretation of these statements is that they are intended to convey to the reader a description of our cellular accumulations (figs. 6, 7 and 21).

He notes larger clusters of small round cells in the papillary derma, and these convey to us an impression that he saw our tubercle-like formations without recognizing their character because he failed to meet with a giant cell. The papillae are described as being often very edematous.

The hairs were few and their muscles were hypertrophied, while the dermic coat was thickened, the bulk shrunken and fused with the papillae; points which are

horne out in our figs. 13 and 12. He states that no sebaceous glands could be found in his section and this is the same in our preparations.

He states that the sweat glands were normal but their orifices were dilated and that the elastic fibres of the corium were normal.

Unna divides the lesions as follows:—

I. Simple Elementary:—

1. Follicular papule.
2. Poral papule.
3. Sinuous papule.

II. Syntanthes:—

4. Erythrodermia.
5. Psoriatiform patches.
6. Stalactiform patches.

The Follicular (vide our fig. 11) is part of a general primary very marked hyperkeratosis in which the horny layer is twice or thrice as thick as normal and extends into the mouth of the hair follicle forming the follicular papule and may extend the full length of the follicle, which is surrounded by an infiltration of cells the majority of which are small and poor in cytoplasm while some few are plasma and mast cells. The stratum granulosum consists of two or three rows of cells and the rete is widened.

The Poral papule (vide our fig. 16) consists of horny cones around the sweat pore, together with an infiltration of the papillae.

The Sinuous papule is formed by a deep fold of the horny layer penetrating into the cutis, and distends the horny layer on each side (our figs. 7, 8 and 10). This horny layer and the granular layer are both thickened and help to elevate the papule, which is dry, broad and conical, and may be covered by a scale, soaked in sero-fibrinous exudation (vide our figs. 7 and 8). In the centre of the papule there is neither sweat pore nor follicular opening, but these may be found enclosed in the margins (vide our fig. 7, which shows a poral papule a little distance from one margin). The blood-vessels beneath the papule are widely dilated, while the cellular infiltration is, as usual, moderate. It is because of the marked depression of the horny layer in the centre of the papule (vide our fig. 10) that Unna gave it the name of the Sinuous papule.

The Erythrodermia, according to Unna, has still to be described (vide our fig. 9).

The Psoriatiform patches are formed by the individual horny cones running together (our figs. 2, 3 and 4 show how they tend to do this) into a common patch which is covered by scales. Histologically the horny layer is greatly thickened and forms horny taps, pearls and folds, while there is a well marked acanthosis, the blood capillaries are much dilated and the cellular infiltration is increased and there is here and there inside the epithelium, especially round the apices of the papillae, a local leucocytosis of wandering cells which singly and in groups press the epithelium apart, and as cornification proceeds form small enclosed nests of nuclei and nuclear fragments.

The share of the hair follicles, whose sebaceous glands are always atrophied, and the coil glands in this process is the same as when they form papules. The hair muscles are well developed. Our sections from the face show, in places, some approach to this condition, but we have no sections which show it in its typical form because the patches were not present in our patient.

The Stalactiform patches are found over the knees and elbows and were not found in our case. Histologically they are a group of epithelial ridges united under a common horny covering which forms coarse, plaster-like taps and conical masses running together at their base.

A combination of Taylor's and Unna's descriptions, properly interpreted, bring out many of the features seen in our photographs.

Hartzell, as quoted by Stelwagon, describes a condition something like Unna's Psoriatiform patch.

Vigmo Lozulati notes the hyperkeratosis of the mouth of the hair follicle, the slight inflammatory changes

involving the papillary and subpapillary layers of the corium, an atrophic sclerosis of Meissner's corpuscles and of the nervi communicantes. He considers that the inflammatory changes are secondary to the hyperkeratosis, which is due to a toxic neuritis leading to atrophic sclerosis of the nerves and their endings.

Alfred Scott found that the horny layer was thickened and extended into the mouths of the follicles, that the granule layer was also thickened and that there was a small amount of cellular infiltration into the upper part of the cutis.

Beatty described the thickened horny layer, the well-marked stratum lucidum, the horny projections into the hair follicles, and the moderate infiltration of cells of varying size into the upper part of the cutis.

Tschlenow was of the opinion that the primary seat of the disease was the epidermis, while the inflammatory changes seen in the cutis were secondary.

Riecke, according to Mracek, states that the sebaceous glands are markedly hypertrophied (surely this must be an error in translation and must be atrophied), that the sweat glands are increased, and the arrectores pilorum materially enlarged.

Neisser's conclusions have already been detailed and should be compared with our findings as the comparison is somewhat interesting.

We have been unable to refer to the works of Heidensfeld, Liddell, Coats, Mourek, and Ravogli, and probably there are many other important observations with which we are unacquainted but sufficient evidence has been brought forward to indicate that there are a number of new points brought out in our sections which, on the whole, agree with the descriptions of Taylor and Unna allowing for certain differences more of description than observation.

This brings us to the description of the possible causation of these pathological changes.

Etiology.—The condition of the rete as depicted in figs. 6, 7, and 15 points to the action of a toxic agent.

The presence of giant cells as shown in figs. 20, 22 and 24, and more especially the cellular formation seen in figs. 20 and 24 suggest that one of the factors of the etiology must be anti-tubercular amboceptors produced as the result of bygone or recent stimulation by the tubercular toxin.

We were unacquainted with this possibility when our patient was under observation, but we have discovered several points in the literature of *Pityriasis rubra pilaris* which support this theory.

(A) Millan, in 1906, first suggested the toxitubercule theory and supported it by:—

- (1) The general and local reaction produced by injecting 0.006 c.c. of old tuberculin into his case.
- (2) Twenty-three of Besnier's collected cases had full records and 52 per cent. of these showed definite evidence of tuberculosis, while those with a certainty or a probability of the infection were 82 per cent.

(B) De Beurmann, Bith and Henyer, in 1910, reported that four out of six children in one family had developed *Pityriasis rubra pilaris*, and it was thought that two cousins also had the same complaint. The four children affected were two brothers and two sisters of ages varying from 12 to

PLATE I.



Fig. 1.



Fig. 2.

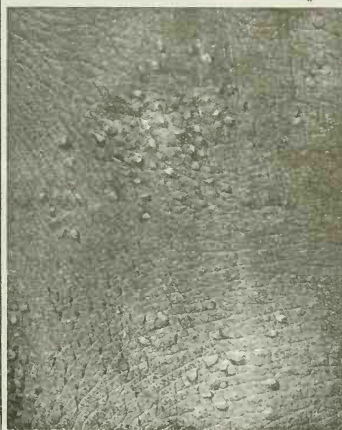


Fig. 3.

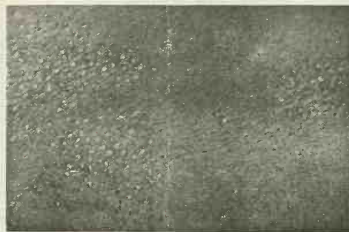


Fig. 4.

PLATE II.

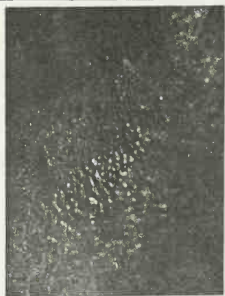


Fig. 5.

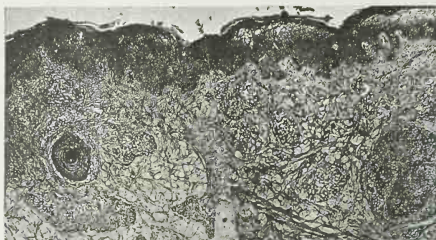


Fig. 6.

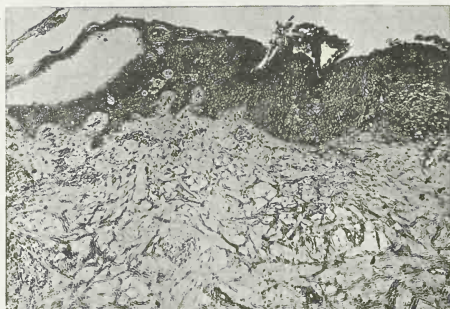


Fig. 7.



Fig. 8.



Fig. 9.



Fig. 10.

PLATE III.

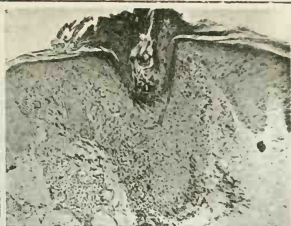


Fig. 11.



Fig. 13.

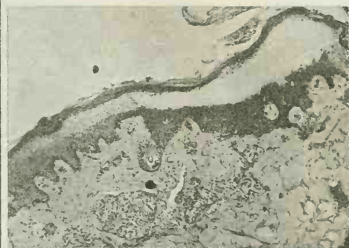


Fig. 15.



Fig. 17.

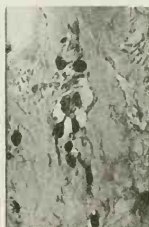


Fig. 18.



Fig. 12.

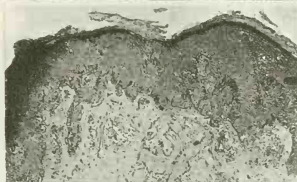


Fig. 14.



Fig. 16.

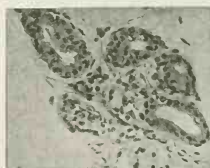


Fig. 19.

PLATE IV.

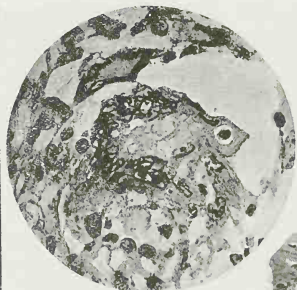


Fig. 20.

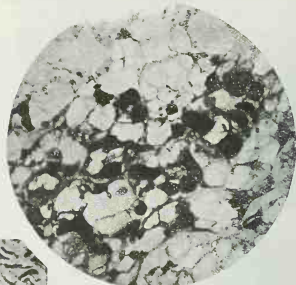


Fig. 21.

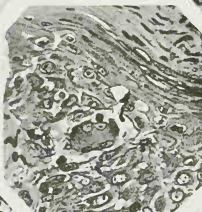


Fig. 22.

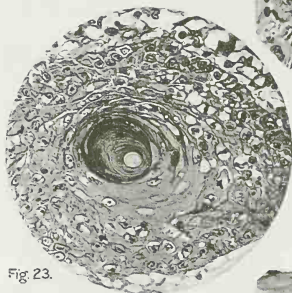


Fig. 23.



Fig. 24.

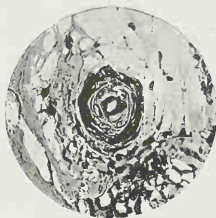


Fig. 25.

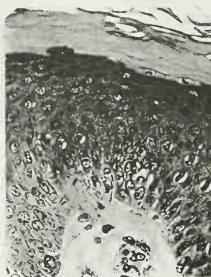


Fig. 26.

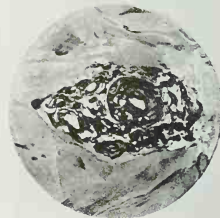


Fig. 27.

To illustrate paper on "Sudanese Examples of Two Common Hyperkeratoses," by ALBERT J. CHALMERS, M.D., F.R.C.S., D.P.H., and Captain ARTHUR INNES, R.A.M.C.(T.)

28 years. This family history is noted to be unique and to support the toxi-tubercuïde theory because:—

- (1) One patient had apical phthisis.
- (2) In three cases the intradermic reaction confirmed the theory of a tubercular cause.
- (3) In one case tuberculin injected gave a positive reaction.

(C) *Sequeira* in one case obtained a positive von Pirquet's reaction, but in several others this was negative.

The explanation may perhaps be on the lines suggested by Chalmers and Martyn for acnitis, viz., that the anti-tubercular amboceptors represent the *anaphylactin*, and that this lies dormant in the cutaneous cells until awakened by an *anaphylactogen* in the presence of some *adjuvant*.

If this is so, then we are entirely lacking in our knowledge as to the origin and nature of the two last-named factors, though there does appear to be evidence in favour of the first being tubercular in origin.

Pathology.—The cellular changes in the rete depicted in figs. 6, 7 and 15 point to the origin of the *anaphylotoxin* being in that layer.

It is known that *anaphylotoxin* is rapidly split up into less toxic products and it is possible that these passing superficially cause the hyperkeratosis or deeply in the lymph give rise to the conditions depicted in figs. 17 and 18, and thus cause the cellular masses of the corium.

The peculiar disappearance of the sebaceous glands makes it worthy of inquiry as to whether these are important sites for the formation of the *anaphylotoxin*, but we can bring forward no evidence either way with regard to this matter.

Classification.—If our views as to the possible causation are proved to be correct, the disease is essentially a "tubercuïde," and the hyperkeratosis is secondary and general.

In this way its position would be altered from that given in the table of the hyperkeratoses by Chalmers and Atiyah, viz., under the Primary Hyperkeratosis of unknown origin to the Secondary Hyperkeratoses, and would form there a generalized class.

Diagnosis.—The characteristic features of *Pityriasis rubra pilaris* are:—

- (1) The presence of hard, discrete, conical follicular papules, especially on the dermal aspects of the first phalanges of the fingers and other places. The little elevated plug, on being picked out, discloses the mouth of a follicle and is itself composed of epidermal scales.
- (2) These conical papules do not increase in size, as a rule, but patches are formed by new papules appearing in between old papules.
- (3) The patches may become much thickened and scaly and resemble *Pityriasis*.
- (4) There is often a dry pityriasic condition of the scalp, and when the scales are removed they may be seen to come from the hair

follicles. In addition, there is often a hyperkeratosis of the palms of the hands and the soles of the feet, and there is always a more or less diffuse hyperkeratosis.

- (5) Poral and sinuous papule should be searched for with a lens.
- (6) The good condition of the general health, as a rule, is important.

The differential diagnosis may be effected as follows:—

From the *Lichen spinulosus* of Devergie it may be distinguished by the eruption being general, by attacking the hands, by the follicular plug being scaly and not spiny.

It can be separated from the *Lichen convexus* of Castellani (*Lichen pilaris convexus*) by the presence of the plugs in the follicular patches, and by the presence of scabing on patches.

From the *Keratosis suprafollicularis* of Unna (*Keratosis pilaris* of Crocker) it may be differentiated by its eruption being more general in character and by attacking the hands, by its erythrodermia, its poral papules, its psoriatiform patches, its palmar and plantar hyperkeratosis, and its pityriasic condition of the scalp.

From the *Ulerythema ophryogenes* of Unna it can be recognized by being generalized and not confined to the eyelids, forehead and cheeks, and in possessing follicular papules which are part of a generalized hyperkeratosis and not merely prominent hair follicles on an erythematous base, and also by the absence of moniliform hairs.

From *Ichthyosis follicularis* it may be separated by not being congenital in origin and by the signs which distinguish it from *Ichthyosis*, which is usually present in a mild form in *Ichthyosis follicularis*.

From *Ichthyosis* it may be recognized by being of comparatively recent onset (even in a child) and not dating back to within a short period after birth and also by the presence somewhere of the erythrodermia.

From Brocq's *Congenital ichthyosiform erythrodermia* it can be diagnosed by not being congenital nor, as a rule, commencing in earliest infancy and by the typical follicular papule; in fact, Brocq's disease can be differentiated by remembering Rasch's term for it of *Ichthyosis rubra*.

From *Pityriasis rubra* it may be divided by the relatively slight amount of erythema, by the small scales, by the typical hard conical papules in the follicles on the dorsal aspects of the first phalanges of the fingers, by the absence of constitutional symptoms and by its benign and chronic course.

From *Dermatitis exfoliativa* by the slight erythema and the more evident thickening of the skin and the less pronounced scalliness.

From *Psoriasis* it may be distinguished by its typical papules and their non-extension by

growth and by the formation of patches only by the interposition of new papules. The psoratiform patches can be separated from psoriasis by the density of the crusts and by the presence of erythrodermia of the face, the pityriasis condition of the scalp or the hyperkeratosis of the palms or soles. Nevertheless, judging from recent proceedings of dermatological societies there appears to be the greatest difficulty in the diagnosis of the two diseases, and it seems quite possible to make a mistake.

From the *Lichen planus* of Erasmus Wilson it may be diagnosed by the absence of the discrete, flat, angular, often umbilicated, shining purplish-tinted papules. These characters should be found somewhere even when *Lichen planus* presents its verrucose or scaly patches, and when the absence of itchiness and the involvement of the face, scalp, palms, or soles is present, the diagnosis is easy.

From the *Lichen neuroticus* of Unna and the *Lichen ruber* of Hebra it is separated by the absence of the constitutional and nervous symptoms and by its non-epidemicity. Our microscopical investigations do not confirm Neisser's differentiations between the two diseases, but his clinical points are definite, and never having seen a case of *Lichen neuroticus* we are unable to make any personal statement.

For the benefit of the tropical practitioner, who will understand why we put this in, it can be distinguished from *Scabies* by the absence of itching, by the absence of the acarus, and by the characters given above.

Treatment.—It is obvious that the treatment must be long continued and must aim at neutralizing the exciting toxin in a recent case and in all cases at relieving the cutaneous condition.

We have detailed the treatment of our present case in the clinical section but we did not have the patient long enough in our hands and we did not know what we do to-day about the etiology.

Summary.—The *Pityriasis rubra pilaris* of Devergie is a disease quite distinct from the *Lichen planus* of Erasmus Wilson and probably also from the *Lichen neuroticus* of Unna, which may be the same as the *Lichen ruber* of Hebra.

It is probably caused by a toxin which may arise as an anaphylotoxin, of which the anaphylactin factors are amboceptors present in cutaneous cells and due to the action, at some time or other, of the tubercular toxin. The anaphylactogen factor is unknown.

It is, however, quite a distinct disease from *Acanthosis*, or *Lichen nitidus*, having no clinical features in common, and the same is true for *Lichen scrofulosorum*.

Many points indicate a partial similarity of causation with *Ichthyosis*, and it may be that the unknown anaphylactogen factors are allied.

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ILLUSTRATIONS.

(These illustrations may, with advantage, be examined by means of a reading lens.)

PLATE I.

- FIG. 1.—The face to show the erythrodermia and the scalliness. Photograph.
- FIG. 2.—The dorsal aspect of the hand to show the typical conical lichenoid papules. Photograph.
- FIG. 3.—An enlargement of a portion of fig. 2 to show the individual papules and the formation of patches. Enlargement.
- FIG. 4.—Papules on the forearm. Photograph.

PLATE II.

- FIG. 5.—Back of the neck to show a patch of papules. Photograph.
- FIG. 6.—Two photomicrographs of a section from the forearm pieced together to show the general histological appearance. Note the degeneration of the cells of the rete, which is thick; the cellular accumulations, the hair follicle cut transversely and the peculiar epidermal mass in the lower right hand corner. $\times 45$ diameters. Photomicrograph.
- FIG. 7.—Continuation of fig. 6. From left to right note space in the rete, the Poral papule, the Sinuous papule, and in the corium the cellular masses. $\times 45$ diameters. Photomicrograph.
- FIG. 8.—Sinuous papule from the forearm. (The black speck near the middle is dirt.) $\times 65$ diameters. Photomicrograph.

FIG. 9.—*Erythrodermia* from the face. $\times 100$ diameters. Photomicrograph.

FIG. 10.—*Sinuous papule*, same as fig. 8 but near the centre. $\times 55$ diameters. Photomicrograph.

PLATE III.

FIG. 11.—*Follicular papule* from the face. $\times 30$ diameters. Photomicrograph.

FIG. 12.—*Hair follicle and bulb* from the face; (the section is placed laterally). $\times 220$ diameters. Photomicrograph.

FIG. 13.—*Arrector pili* from the face. $\times 100$ diameters. Photomicrograph.

FIG. 14.—*Stratum granulosum* and *Acanthosis* from the forearm. $\times 65$ diameters. Photomicrograph.

FIG. 15.—Degeneration of the cells in the superficial layers of the rete from the forearm. Note also the cellular masses in the Corium. $\times 55$ diameters. Photomicrograph.

FIG. 16.—*Poral papule* from the forearm. $\times 290$ diameters. Photomicrograph.

FIG. 17.—Dilatation of the lymph spaces in the connective tissue of the corium from the forearm. $\times 300$ diameters. Photomicrograph.

FIG. 18.—Proliferation of the endothelial cells lining a lymph space from the forearm. $\times 350$ diameters. Photomicrograph.

FIG. 19.—Acinus of a sweat gland from the forearm. $\times 100$ diameters. Photomicrograph.

PLATE IV.

FIG. 20.—Giant cells in a papilla of the skin. Fig. 24 shows a general view of another section, and contains the same tubercle-like formation, in the skin of the forearm. $\times 500$ diameters. Photomicrograph.

FIG. 21.—A portion of a Cellular Accumulation to show the reticulum of endothelial and connective tissue cells and the lymph spaces. $\times 500$ diameters. Photomicrograph.

FIG. 22.—Giant cell lying at the apex of another papilla in the forearm. $\times 300$ diameters. Photomicrograph.

FIG. 23.—Transverse section of a hair follicle from the forearm. $\times 350$ diameters. Photomicrograph.

FIG. 24.—Tubercle-like formation in a papilla from the skin of the forearm, and a sinuous papule. $\times 70$ diameters. Photomicrograph.

FIG. 25.—Sweat duct surrounded by an increased amount of connective tissue. $\times 300$ diameters. Photomicrograph.

FIG. 26.—Epidermis and a papilla from the forearm. $\times 350$ diameters. Photomicrograph.

FIG. 27.—Sweat duct surrounded by cellular masses from the forearm. $\times 300$ diameters. Photomicrograph.

HAWAII.—The total estimated population on June 30, 1918, was 256,180. The total number of deaths was 4,010, an increase of 512 over the previous year. The annual rate per thousand of population was 15'65, and excluding the deaths from external causes, 315, the annual rate would be 14'42 from disease alone. In the city of Honolulu there were 1,395 deaths, an increase of 126 over 1916-1917. The total number of births during the year was 9,404, and according to the figures of the Japanese consulate, 5,086 of these were Japanese. The birth rate for the territory was 36'71, as compared with 34'75 for the previous year. There were 2,039 cases of contagious and infectious diseases reported, an increase of 178 over the previous year. The number of cases of typhoid fever reported was: Oahu, 1,287; Hawaii, 382; Maui, 153; Kauai, 207; Molokai, 11. All sanitary measures were vigorously carried out during the year, including the rat campaign. Tuberculosis reported numbered 937 cases as against 900 for the previous year. June 30, 1918, the number of lepers in the settlement was 608, an increase of twenty-one from the previous year. An advance in treatment was made, apparently, in the employment of four different fatty acid fractions isolated from chaulmoogra oil.

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THE JOURNAL OF

Tropical Medicine and Hygiene

JUNE 2, 1919.

THE FUTURE OF WEST AFRICA.

WHILST holding the military forces of the Central Powers in Europe, fighting the Prussian-led Turks in Asia and sweeping the Kaiser's fleets from the seas, the British and their Allies have been uprooting every colony planted by Bismarck and William II in

Oceania, Africa and Asia. Germany's colonial power and her dream of a vast African Empire are passing away like the bone and the shadow of Æsop's dog. Kiau-chou has been recaptured, German New Guinea, the Bismarck Archipelago, the Solomon and Marshall Islands, the Carolines, the Ladrões, and the charming Samoa group are within our grasp, the Togoland wedge has been removed, the Black Eagle has fallen from the Cameroons Peak, and stalwart Nigerian troops returning from the battlefields of East Africa, have told us that German East Africa, like German West Africa, is a thing of the past.

In what way is the war likely to affect West Africa?

It will greatly help to hasten its development. It has brought very forcibly before us the necessity of more abundant supplies of food and raw materials, the paramount importance of sanitation and the expediency of more reasonable and equitable views concerning intercourse between men of different race, character, attainment and training.

What a glorious country that vast stretch of land comprised between Cape Verde and Lake Chad, the Sahara and the Atlantic! Draw a picture of its past, to compare it with its present conditions and to outline its prospects. When first we approached this region, in Elizabethan days, the desert was spreading its sands southwards; the ocean, in its Guinea salient, was battering the shore with endless lines of thundering breakers. The pioneer, who escaped wreckage, landed on a deadly coast, the domain of the "fever fly" whose name is recorded, with the names of gods and mighty kings, on Babylonian clay tablets, baked 7,000 years ago. If not immediately stabbed by the winged demons of yellow fever and malaria, he found further progress barred by hostile, man-eating natives, deadly wild beasts, impassable cataracts, vast mangrove swamps, and the impenetrable rain forest which relentlessly closes in upon all attempts at clearing.

There was a great waterway—the Niger—which grips the whole region, like a hand stretched out from Timbuctoo—the old, world-renowned emporium of Central Africa—but its mouth was hidden in a strange miz-maze made up of innumerable distributaries, islands, floating masses of tangled vegetation and mangrove forests which rendered it more intricate and bewildering than the Cretan Labyrinth; and it harboured monsters more fearful than the minotaur. The lure to this accursed land was gold-dust, ivory, and the trafficking in slaves.

Now, Union Jack and Tricolor flutter over this territory like the wings of brooding fowl, the "peace drum" is uncovered, human sacrifices and cannibalism are forbidden, export slavery is abolished, the hunter is becoming herdsman or tiller of the soil, and, whilst the watered plant is beginning to hold the shifting sands up north, long jetties and piers brave the tremendous surf in the south. Sanitation is improving, high explosives are blasting the river barriers, railways are piercing the dense forest, steamers are plying up and down the waterways, and palm-oil, cotton, earth-peas, kola-nuts, gums, cocoa,

hides, timber and rubber have become more profitable exports than human cattle.

Although our West African trade is centuries old, so far, very little has been done to develop the natural resources of the vast, rich, fertile lands that lie south of the Senegal, the Niger and the Komadugu, on account of their appalling unhealthiness. Indeed, the West Coast of Africa has been a veritable charnel-house well deserving to share with Panama the name of "White Man's Grave." About a century ago, strange as it may sound, the deaths among white troops, on the Gold Coast, were in the proportion of 1,500 per 1,000 per annum!

Until quite recently this fearful mortality was put down to "malaria," a comfortable word which cloaked much ignorance and neglect. By degrees, owing chiefly to the admirable researches of French army and navy surgeons, the complex nature of "West African fever" was apprehended, and out of the tangle were extricated subtertian fever, yellow fever, blackwater fever, enteric fever, and other diseases which had been confounded with typical ague, as we knew it, in this country, in the days of Cromwell. Yet, even now, notwithstanding all our progress in tropical medicine, these diseases are either confounded, or their individual nature not fully understood by the majority of physicians. The severe malaria of West Africa is none other than the subtertian fever of Hippocrates, still widely prevalent in the Mediterranean region, so that we must look to other diseases, and foremost to yellow fever, to explain the fearful, swift, cobra-like deadliness of the West African hydra. Nor can anything prove more strikingly the deadly nature of this disease than the history of the French expedition to San Domingo in 1802. When General Leclerc left Brest, the effective strength of his army was 58,545 men. In less than four months over 50,000 had been killed by yellow fever, and, seven years later, when the army returned to France, it numbered 300 men only. Several authors have proclaimed the African origin of this "hurricane of the human frame," but we lack the necessary historical data to decide whether it belongs to the Ethiopian or neotropical region. Some consider it peculiar to the larger Antilles, but, probably, like malaria and typhus fever, it is equally old on both sides of the Atlantic.

Next to yellow fever one of the most striking of West African diseases is blackwater or hæmoglobinuric fever. Recent parasitological and epidemiological observations have greatly widened our view, and there can be little doubt but that, very soon, we shall possess knowledge so definite concerning this malady that it will be possible to take effective preventive measures against it.

But more deadly than either subtertian or blackwater, or even yellow fever, though slower in its course, is the dreaded sleeping sickness, which, until quite recently, had escaped recognition in Europeans, and was, therefore, looked upon as a distemper peculiar to the Negro. This human trypanosomiasis extends throughout the whole region, stretches down to the Kwanza, in Angola, and runs across Equatorial

Africa to the great lakes of Rudolph, Nyanza and Tanganyika, prevailing wherever the dusky tsetse fly (*Glossina palpalis*) and other glossinæ abide, and whose function is the transmission of this disease. Arguments grounded on all the epidemiological information available, on microscopical observations and on the experiments made by Dr. David Livingstone and Sir David Bruce on nagana (a tsetse-borne trypanosomiasis of horses and cattle), prove, contrary that the tsetse flies, both in sleeping sickness and nagana, do not act merely in a passive way, but are necessary specific hosts of the respective trypanosomes. Within the body of the flies, the trypanosomes undergo a particular stage of development and multiplication analogous to that of malarial parasites in their mosquito alternative hosts. And my views, discredited at the time, were fully confirmed, nine years later, by Kleins's careful researches.

Other diseases, now common to most tropical countries, such as leprosy, small-pox, enteric fever, pneumonia, cerebro-spinal meningitis, beri-beri, yaws, syphilis, dysentery, ankylostomiasis, schistosomiasis and elephantiasis, are very prevalent in West Africa, and probably some of them, such as Stiles's ankylostomiasis and Sambon's schistosomiasis, were introduced into the West Indies and the Americas by West African slaves during the sixteenth century. The probability of this importation is supported by the history of many weeds, such as the Russian thistle, introduced into the United States in flaxseed brought over from Russia in 1873, and of insect pests, such as the Hessian fly, imported in straw by Hessian troops during the war of the Revolution, and, indeed, by the very failures of other West African diseases, such as sleeping sickness and Calabar swellings, which, though repeatedly brought over in the days of the slave trade, never became acclimatized in the Americas, owing either to the absence of suitable alternative hosts, or to the want of other necessary ecological conditions. Dracontiasis holds a most suggestive intermediate position, because the Guinea worm (*Dracunculus medinensis*), whilst failing to become acclimatized over the greater part of its area of importation, as in the West Indies, where it was very common in the days of slave trafficking, has maintained itself in certain parts of the Guianas and in the State of Bahia in Brazil.

Whilst some diseases, such as the necator ankylostomiasis of the Ituri forest Pygmies and that essentially West African form of schistosomiasis, the snail-carried parasite of which has isolated and named *Schistosomum mansoni*, were almost certainly imported into the Americas from West Africa, others, common both to Africa and the Americas, have no doubt prevailed in the two hemispheres from a very remote age, when land and water were very differently distributed over the surface of the globe. However, as a rule, the latter diseases, though generically identical, are not specifically so. Thus, there can be no doubt whatever that, though probably related to Ethiopian and Oriental trypanosome diseases, the South American trypanosomiasis, with its peculiar clinical

and pathological features, its "assassin bug" carrier and its armadillo reservoir, so ably studied by Carlos Chagas, is an indigenous form as old as the copper-coloured man. Again, the West African python, the royal python, and all the hideous puff, adders of West Africa harbour in their lungs, tracheæ and nasal cavities a strange worm-like, blood-sucking arachnid (*Porocephalus armillatus*), the young of which, when taken up in drinking water, pierce their way through the stomach walls and encyst themselves in the mesentery, liver or lungs of monkeys and other mammals, including the ichneumon, the lion, the giraffe, the chimpanzee and man. After a period of quiescence, if the host is not squeezed to death and swallowed by a python, the parasites may break open their enclosing capsules and tear the surrounding tissues, generally causing fatal injuries in their endeavour to reach the open. Similar parasites are found in the South American boa, in the bushmaster and in the various rattlesnakes, but they belong to different species (*P. clavatus*, *P. stilesi* and *P. crotali*), hitherto confounded with those of the old world, and are certainly indigenous to the neo-tropical region since the Cretaceous period, when the Africano-Brazilian continent was divided by the transgression of the Cenomanian Sea.

Of course, West Africa has diseases of its own not found in other tropical countries; thus, the so-called "Calabar swellings" are caused by *Loa-loa*, a West African filarid which ranges from Sierra Leone to Benguela and is especially common in Old Calabar, in the Cameroons, and in the basin of the Ogowe. This long-lived worm may for years ramble about the body of its host, travelling through the loose connective tissue, either beneath the skin and mucous membranes, or between the muscles, nerves, blood vessels and organs. From time to time it gives rise to single transient œdematous swellings, as large as fowls' eggs, which may appear on the face, the neck, the trunk or the limbs, often causing pain or discomfort. Occasionally a peculiar greenish discolouration of the skin is noticed over the subsiding swellings indicating blood extravasation and, possibly, as conjectured by Sir Patrick Manson, these peculiar swellings may be connected with oviposition on the part of the strolling female worm. The young larvæ, still ensheathed in their outstretched egg-membranes, pass into the blood-stream and probably harbour within the large arteries and lung "veins," the whole brood moving out each day, like a fishing fleet, into the peripheral circulation, during the hottest hours, in correlation with the midday hating habits of their alternative host, a gadfly called *Chrysops* on account of its brilliant gold-green eyes. Another filarid worm peculiar to West Africa is the *Onchoceerca volvulus*, which gives rise to small indolent tumours amongst the riverine people.

Of the many pests which afflict West Africa there is one not hitherto recorded, a large horse-leech (*Limnatis africana*) about five inches long when fully extended. It is seen in the bush on man, dog and monkey, attached to the mucous membrane of the

nasal cavities, with the anterior part of its body often extended and dangling from the nostril like a rat's tail. It is taken into the system whilst drinking, and is said to occasion great debility and sometimes serious illness. A much smaller species (*L. nilotica*) is a well-known and dangerous parasite of horses, cattle and man throughout the Mediterranean region, and is the same that caused serious inconvenience to Napoleon's army in Egypt.

A strange pest is the "floor maggot," the larva of a stoutly-built fly of smoky-brown colour called *Auchmeromyia luteola*. This maggot, described by Robert Clarke in 1843, hides in floor crevices, beneath the mats on which the natives sleep, emerging at night to suck blood, a habit which it has in common with certain fly-maggots (*Phormia*, *Passeromyia*) that infest birds' nests, feeding on the nestlings after the manner of leeches. Another obnoxious fly-maggot is the "Ver de Cayor," the fat, yellowish larva of *Cordylobia anthropophaga* which, like cattle bot-flies, form warbles in the skin of man.

A prevalent and most annoying pest is the chigoe, jigger or sand flea (*Dermatophilus penetrans*), the female of which has the habit of taking shelter beneath the skin of its host during gestation. Sometimes hundreds of them may infest the sole of a foot, giving it the appearance of a honeycomb. The chigoe is an alien, belonging to the neotropical region, and was brought over to West Africa from Brazil, Mexico, or the West Indies. All textbooks on tropical medicine, copying one from the other, indicate 1872 as the year of its importation and some even name the "Thomas Mitchell" as the ship that brought it over. It must, however, have been introduced at an earlier date, since Clarke, in his book on Sierra Leone, published in 1843, and Winterbottom still earlier, mention the sand flea as already present in that part of the West Coast. However, and notwithstanding Skripitzin's vague statement of its presence in Mozambique prior to 1840, it does not seem to have reached the East Coast until about the end of the nineteenth century, and was thence introduced into India by Hindu coolies returning home.

L. W. SAMBON.

Annotation.

Leprosy at Marseilles (L. Perrin and G. Brac, *Presse Med.*, February, 1919).—L. Perrin and G. Brac examined for traces of leprosy all colonial troops arriving at Marseilles. They have been able to detect the disease thus in its very earliest manifestations. In some cases there was merely depigmentation of the skin at various points, giving the body a piebald aspect, although the visible portions of the skin were apparently normal. One robust negro had one shoulder, the upper arm and half of the back form a white area in sharp contrast to the ebony skin around. Fifty men with incipient leprosy have been detected among

the troops or working in factories, and have been repatriated. The leprosy had escaped detection when they entered the country. In some cases the only manifestations are a few tubercles, usually grouped in a circle on a zone of erythema; sometimes the lesion is scarcely larger than a shilling, and differentiation from syphilids and tuberculids is difficult. The increase in size of the ulnar nerve and the disturbances in sensibility confirm the diagnosis, but the sensibility may be variable and conflicting. Persistence of sensation does not exclude leprosy. Sometimes there is dissociate sensibility. One man with far advanced leprosy showed only large achromic patches on the body, although the ulnar nerves were enlarged, with symptoms of neuritis in the arms, atrophy of groups of muscles and, finally, gangrene of the left leg. In conclusion, persons even with the initial manifestations of leprosy are liable to spread the germs broadcast.

Abstract.

PATHOGENESIS OF DEFICIENCY DISEASES AND PELLAGRA.¹

By P. RONDONI.

Lecturer on Bacteriology at the Medical School of Florence.

HAVING seen the interesting report by Colonel McCarrison (of the Pasteur Institute of Southern India) on the changes in the organs of pigeons fed on polished rice and suffering from polyneuritis, I wish to call attention to some results which I obtained several years ago when working on other forms of deficiency diseases; they were published in the summer of 1915, in the Italian review *Sperimentale*.

After working for some years subsequent to 1911 on the pathogenesis of pellagra, I found that the exposure to light of white mice fed on maize neither shortened their life nor did them more harm than maize feeding in the dark. I could not find any precipitins in the serum of pellagra patients (for maize extracts or maize protein) as some had asserted, nor could I demonstrate any positive complement fixation between serums of pellagra patients and maize extracts.

Other researches were directed towards the study of general and local reactions of pellagra patients to the injection of maize extracts under the skin. There was some positive expression of hypersensibility, owing, perhaps, to sensitization of those pellagra patients living on maize meal to maize proteins, through the intestinal tract. My countryman Volpino has worked much on the hypersensibility reactions of pellagra patients to maize extracts.

Later on I adopted the conclusion, which was rapidly gaining favour, that pellagra must be regarded as a deficiency disease, and that the

¹ Abstracted from the *Brit. Med. Journ.*, May 3, 1919.

problem of its etiology ought to be studied as far as possible according to the new methods developed chiefly by American investigators. New researches seem to show that dogs can become ill with pellagrous symptoms when fed on a special diet, and a long series of investigators have studied the effects of maize feeding on rabbits, and especially on guinea-pigs. I have studied the maidism of guinea-pigs from different points of view, and these are the experimental researches which it would be useful to resume in order to make a comparison with the interesting data of McCarrison.

It is well known that exclusive maize feeding very quickly brings about a severe pathological condition in guinea-pigs, which die in a few weeks after having lost about one-third of their weight. In the last period of their life the animals suffer from loss of hair, weakness of the legs, and diarrhoea. We know also that guinea-pigs, when fed on cereal grains alone (oats, wheat), develop a typical scurvy-like condition with lesions of bones, bone-marrow, teeth, and blood-vessels—these last occasioning a real hæmorrhagic diathesis. This scurvy-like condition of guinea-pigs (which is most quickly produced by oat feeding) was considered to be the result of lack of accessory food factors or vitamins. The features of the experimental diseases were compared to those of the scurvy of men, and chiefly to Barlow's disease. Recently McCollum has denied the existence of antiscorbutic vitamins, and has shown that there are only two accessory growth-promoting and life-maintaining factors, one water-soluble A and the other fat-soluble B. Now the scorbutic condition of guinea-pigs fed on oats would be due less to a lack of accessory factors in the diet—that is, to a chemical deficiency of it—than to a physical character of the cereal grains leading to undue retention and putrefaction of faeces in the enlarged cæcum of the animals and thereby to intoxication, with changes in the walls of the vessels and perhaps secondary infections by special bacteria. Nevertheless, McCollum points to deficiency of factor A in all cereal grains and also in oat kernel. And although he does not recognize scurvy as an avitaminosis, we can still admit that qualitative deficiency of proteins, lack of deficiency of certain accessory factors (chiefly fat-soluble), and of salts play a rôle in the inadequacy of cereal grains when given alone to support the life of animals, with or without other chemical disturbances (acidosis) or with physical conditions of the food (McCollum).

In 1913-14 I at first tried to show the differences between the more typical scurvy (oat feeding) and the conditions produced by feeding on maize, which is the cereal more related to the etiology of pellagra; also between these two pathological conditions and simple starvation (by complete suppression of food). Like McCarrison, I measured the weights of some organs and found in all these conditions the adrenal glands are enlarged, principally in oat-eating and maize-eating guinea-pigs. The loss of body weight is only one-third, while the relative weight of the adrenals is about doubled.

The spleen was reduced in weight, chiefly in the oat-eating and in the starving animals, and some evidence was found of an atrophic condition of this organ, as McCarrison has seen in his pigeons.

My histological observations can be summarized as follows:—

The organs which are the most affected in guinea-pigs fed on maize are the spleen, the thyroid, and the suprarenal glands. The spleen shows sclerotic lesions with increase of elastic and fibrous tissue and reduction of lymphocytes in the folliculi. The thyroid shows, in the first days of maize diet, hyperæmia and often proliferation of alveolar epithelium, then hæmorrhagic changes, and later on sclerosis are prominent.

These changes, so far as I know, have not been observed before, but they may be compared with those remarked by some observers in the thyroid of starving animals or of animals fed on other special diets. The suprarenal glands show hyperæmia, enlargement of minute vessels, degenerative changes in the cortical cells with disappearance of the normal lipoids (Sudan III coloured substances), perhaps slight proliferation in the cells of the outer cortical layer; the reticular fibres become thicker, the reaction with chromium salts in the medullaris seems to be less marked. Degenerative changes were prominent in the central nervous system. By means of Nissl's method I observed signs of decay in the anterior horn cells of the spinal cord and in Purkinje cells of the cerebellum, and by Marchi's method frequent irregular fresh degeneration of all sorts of medullated fibres. The changes in the bone-marrow were of the same kind, but in a less degree than those observed as the result of other cereal feeding. Less marked were the lesions of the liver (some degeneration of liver cells, some hyperæmia, some hypertrophy of Kupffer cells, sometimes perhaps proliferation of these cells), of the intestinal tract, of the kidney, and of the heart.

Guinea-pigs fed on oats had much more marked hæmorrhagic lesions; the hæmorrhagic diathesis seems to me to belong to the typical scorbutic condition of these animals. Maize feeding brings about an attenuated scorbutic condition, but the results of my experiments show that the central nervous symptoms, fall of hair, sclerosis of spleen and thyroid, are more marked than in scurvy. As regards the effects of starvation, which were already well known, I confirm the difference from the above-named unilateral diets; we have no true sclerosis of organs, lipoids disappear in a much more marked degree from the cortex of the adrenal glands, we have quite different conditions in the bone-marrow. Histologically, death from maize eating is not death from starvation, but involves deep metabolic changes, as in other real deficiency diseases and in some intoxications.

In order to study the reason of the severe injury caused to the organism by maize feeding I tried to supplement the maize meal or maize kernel with many substances. At that time the important work of McCollum was still unknown, or at least

I was not acquainted with results of his which appeared later. Thus I added protein or peptone to the maize meal in order to see whether the failure of this grain to maintain metabolism was due to deficiency of protein. The addition to the maize meal of casein or peptone, or amino acids, such as tyrosin and tryptophan, tried in different series of guinea-pigs, produced no definite improvement. One year later (1916) McCollum, who worked with the method on growing white rats, showed that the maize protein contained all the necessary amino acids, but not all in the most favourable proportions, that at any rate the deficiency of maize could not be sufficiently made good with casein, and that the protein factor had not the paramount importance for rats that it seemed to have for other animals. For rats the first limiting factor in the maize diet is the lack of salts, but I had already written that the protein of maize is, on the whole, less important. I did not take into consideration the salts, but I had already written that the protein deficiency of maize does not seem to have any great importance for guinea-pigs in the development of maldism, and the experiment of supplementing maize with casein had been made by me on guinea-pigs with negative results. For pigs things are on a different basis; protein is here the first limiting factor. I tried further to supplement maize with green food, as green vegetables prevents the development of scurvy. I repeated these experiments on guinea-pigs suffering from the pathological condition which arises from exclusive maize feeding, and seems to me to differ from typical scurvy (from oat and wheat feeding). I found that a quantity as small as 10 grm. a day of fresh cabbage produced in every animal a remarkable corrective action. Animals eating maize meal alone (and water) die after an average period of eighteen days (there are great individual differences, some animals living only a few days, others weeks); animals eating maize meal plus 10 grm. of cabbage died after twenty-five days, and showed loss of weight only in the last days. A few months after the publication of my results in 1915, I read that Sandwith¹ had confirmed this supplementing value of fresh cabbage for maize-eating guinea-pigs. He stated that even smaller quantities of green food were active in this direction. As I had seen that the protein factor was not of much value, and besides this, that the protein content of the active quantities of cabbage was very low, I thought that perhaps there might be in cabbage some accessory factor of unknown composition, some lipid-bound substance, or some vitamin-like principle; accordingly I tried to test the action of alcoholic extracts of cabbage with *positive results* of a prolongation of the average life of maize-meal-eating guinea-pigs. In the light of the new ideas of McCollum I venture to say that with my alcoholic extracts (made with acidulated alcohol at 37°) I partly supplemented the fat-

soluble factor A, which is certainly lacking in all cereal grains and in maize meal too, and is abundant in all leaves. Lately, Osborne and Mendel have found in cabbage a lack of water-soluble vitamin B, and therefore in alcoholic extract we may assume that factor A is present.

Alcoholic extract of maize bran does not supplement maize meal; this again shows that the active substance of alcoholic extracts of cabbage leaves is something which is present neither in maize meal nor in maize bran—that is, something lacking in the whole cereal grain, in the endosperm as well as in the aleuronic layer and embryo; this is the case with factor A, while factor B must be present in good bran with much of the outer layers and embryos of the seed.

Alcoholic extracts of liver (fresh liver of healthy guinea-pigs) prolonged the life of maize-meal-eating guinea-pigs a little; the active substance was present in animal organs, too. This may perhaps be compared with the experiments of Osborne and Mendel, who found the liver, heart, and kidney (of pigs) very rich in growth-promoting vitamin for rats, and of Eddy, who isolated a growth-promoting substance from sheep's pancreas. My conclusion is that in animal organs and in the green parts of plants there must be some alcohol-soluble body which diminishes the harmful action of maize diet on guinea-pigs.

It is well to remember, too, that I found a diminution of adrenalin in the suprarenal glands of maize-eating animals by using suprarenal glands ground up and suspended in saline solution on the uterus of virgin rabbits, and registration of the contraction of the muscular organ; contrary to the results of experiments by McCarrison on pigeons fed on polished rice, pointing to an increase of adrenalin. The difference may be attributed to the different conditions of experimental work and of diet and to the zoological remoteness of the animals used. My work on the etiology of pellagra did not produce conclusive results, but it has established certain facts which may be important in the etiology and pathogenesis of maldism in guinea-pigs and of pellagra in man. I do not assume the identity of these two conditions; the differences are obvious, but there are some resemblances, too. It is a fact that maldism is an experimental deficiency disease due to the lack in maize of the elements necessary to maintain animals. McCollum does not look upon pellagra as a real avitaminosis in the sense used by Funk, and does not recognize a pellagra vitamin, but still he maintains that the experimental symptom-complex obtained in dogs is to be attributed to protein factors, partly to lack of factor A and of salts. For the maldism of guinea-pigs we may still admit a complicated deficiency of maize meal, and we may state that green vegetables and fresh animal organs contain corrective substances. Maldism, at any rate, has features which I think separate it from simple starvation and from typical scurvy.

¹ *Lancet*, October 22, 1915.

Original Communications.

THE CURE OF BILHARZIA DISEASE BY THE INTRAVENOUS INJECTIONS OF ANTIMONY TARTRATE.

By J. B. CHRISTOPHERSON, M.A., M.D., F.R.C.P., F.R.C.S.,
Director of the Civil Hospitals, Khartoum and Omdurman,
Sudan.

I AM interested in the "Notes on a fatal case of Bilharzia treated by Tartar Emetic" in your issue of April 1.

I was in Khartoum at the time the man died, but was in bed with malaria, and my friend Major Innes, who was attending me, did not tell me about the death until I was well; otherwise I should have had the opportunity of attending the post mortem myself.

I submit that this case, as reported, proves nothing at all against the treatment of Bilharziosis by antimony tartrate, but it does appear to show that antimony tartrate kills bilharzia worms.

The man admittedly died of pneumonia and influenza (as he was one of the first fatal cases of influenza in Khartoum—the suddenness of his death probably surprised the medical officers), and the changes described in the organs may all be attributed to intestinal parasites with which the Egyptian soldier is so well supplied, and which, if I mistake not, were not looked for.

The changes described may indeed have been due to the influenza, or perhaps to the bilharzia, or even to the old malaria, all of which the man showed abundant sign of having had, and all of which possible causes the authors dismiss with a stroke of the pen.

There is no evidence connecting antimony tartrate with the man's death, or that it was responsible for any of the pathological changes found after death.

Antimony tartrate, every worker admits, should be used with caution, and it should not be used in doses which cause pathological changes in the tissues, but I trust that this paper will not prevent careful workers giving it a fair trial in bilharzia.

The title of the paper suggests that the man died from the effects of the treatment of bilharzia by antimony tartrate, whereas the man had influenza, broncho-pneumonia with a temperature of 105° F. for several days and pulse of 120—hypertrophy of the left ventricle and a dilated fatty heart.

The above facts are not in question; they are all set out in the paper.

Now supposing that the liver, kidneys and inferior vena cava showed, by microscope, evidence of some fatty degeneration—what is there to show that it was due to the injections of antimony tartrate? What are the facts?

The man shortly before death had symptoms of active bilharzia. At the post mortem there was clear evidence of recent extensive bilharzia in the bladder, but there was no trace of the bilharzia

worms in the portal veins post mortem. They are not difficult to find when present. The evidence then with regard to antimony tartrate—may I suggest—may fairly be taken to be that it had done its work—i.e., killed the worms.

Now let us review the fatty changes found in liver, kidneys, inferior vena cava. Fatty degeneration may be due to:—

(1) Certain poisons, arsenic, bismuth, antimony, chloroform.

(2) Acute infective fevers, continued fevers.

(3) All anæmias—causing malnutrition of organs.

With regard to Group 1, they are well known. We must use drugs intelligently and take care to watch the effect whilst the drugs are being given so that no harmful results follow (e.g., in the case of antimony tartrate, any weakness, loss of weight, chronic anæmia, or any symptom in fact pointing to chronic antimony poisoning should be noticed and the antimony suspended at once.)

In the same way we use arsenic, bismuth, chloroform so as not to cause fatty degeneration.

I do not think that antimony tartrate used cautiously up to the required total of, say, 25 grains is likely of itself to cause fatty degeneration. This has, at least, yet to be proved.

With regard to Group 2. This Egyptian had influenza with a temperature of 105° F. for four or five days. I am not so confident as the writers of the paper that influenza can be dismissed as a cause of fatty degeneration.

And now we come to the anæmias—the diseases which cause poverty of the blood, and consequently malnutrition of organs.

This man had had chronic malaria—with, I assume, its attendant anæmia and its consequences. Can that be excluded offhand as a cause for some fatty degeneration of liver, kidneys, and blood-vessels?

The man had bilharzia of long standing—this is also a fertile cause of anæmia with its attendant evils—enlargement of liver and spleen. Can this be casually dismissed?

And then there are the causes of anæmia and its attendant evils—fatty degeneration of organs and tissues including the heart, so common in Egypt—which were not looked for in this case, namely ankylostomiasis and *Tenia nana* and other intestinal parasites, amœbæ flagellates, &c.

There is little doubt that the authors of the paper attribute certain changes which they saw in the organs to the action of tartar emetic, which they are not justified in doing on scientific grounds, because they did not exclude certain other more probable causes, and apparently overlooked other possible causes.

The pathological and poisonous effects of antimony are very well-known and in my writings I always advised its being used with circumspection and caution, and I always advise that cases (Egyptians especially) should be examined thoroughly beforehand to see whether any contra-indication existed, or whether any intestinal

parasites were present, before the injections were commenced. Was this done in the case quoted?

Egyptian soldiers are liable to suffer from hypertrophy of left ventricle and dilated heart, tachycardia. The Egyptian soldier is also full of intestinal parasites, amoebæ, ankylostoma, bilharzia, *T. nana* (very common), other tape worms, flagellates, &c. These intestinal parasites make him anæmic and I maintain these cause cardiac symptoms and also fatty degeneration of internal organs. It has yet to be proved that antimony tartrate given in doses sufficient to cure bilharzia, namely about 25 grains (total), causes fatty degeneration or any harmful result.

My conclusion that antimony tartrate is a specific cure for bilharzia—not only killing the bilharzia adult worms but also a prophylactic because it sterilizes the ova already deposited in the bladder and rectum (and other) tissues—was based on fifty cases.

The authors of this paper are familiar with our work on bilharziasis at the Khartoum Civil Hospital.

Major Innes has, I believe, the records of over fifty cases treated by himself, which he expressed himself to me as completely satisfied with; he told me that he was going to publish them. I trust he will publish them as well as this case in which the death appears to have been due to influenza.

One thing was looked for in the post mortem and not found: bilharzia worms in the portal circulation. This is striking and, I think, the most significant fact in the whole paper. The presumption that the antimony killed them is very strong.

I have always recommended workers to use antimony tartrate with caution and circumspection, and to remember that they are injecting a powerful remedy for good or evil into a fellow creature's veins. If this is done and the cases are properly examined beforehand for the presence of other parasites in intestines, and for conditions contraindicating the injections, they need have no fear of using antimony tartrate.

Finally, the opinion of the authors that the sudden death was due to fat embolism is, I think, academical and unconvincing. I suggest that it was due to cardiac dilatation. I have seen two kala azar cases die during a course of antimony tartrate. Death was not due to antimony tartrate directly however, in either case. In the Sudan and elsewhere in the tropics such cases often have no skilled nurses to look after them. Kala azar cases in the later stages generally have dilated, flabby hearts. A slight over exertion—sitting up in bed, or straining at stool—is sufficient to cause fatal heart failure. Such deaths are not due to fat embolism. If these cases could be properly nursed such accidents would not occur.

The authors sound a note of warning to those who are employing antimony tartrate in cases of bilharziasis and leishmaniasis, and on general grounds I should naturally be glad to endorse this warning, considering the character of the drug; but

"post hoc" is not necessarily "propter hoc," and I am unable to follow the facts of this particular case as furnishing adequate grounds for the warning administered by the authors.

SEVEN-DAY FEVER.

By Major W. F. M. LOUGHNAN, M.C., L.R.C.P. & S.I.,
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Royal Army Medical Corps.

This fever has been so well differentiated by Rogers as to deserve a place in the official nomenclature of disease.

At present in the official statistics it is returned under the obscure disease "pyrexia of uncertain origin," which conveys little knowledge as to the clinical or other nature of the fever.

The disease as it occurred on the Aden littoral, from clinical observation, leaves little doubt as to its being a very definite and separate fever, requiring classification. In British Arabia it is endemic, and attacks Europeans and Orientals with equal severity. The former are generally affected during their first two years of residence abroad.

Patients suffer from the disease irrespective of age. Males are more affected than females; relapses have not been seen; and in one case the fever was observed for two consecutive years.

General Condition and Appearance at the Onset.—The onset is generally sudden, the patient complaining of a feeling of chilliness, associated with a rigor, and dull pains in the back. The face and neck are flushed, and the conjunctivæ infected. The development of the fever is sometimes insidious, simulating enterica, more particularly the Paratyphoid A group; or enteric fever occurring in persons who have been artificially immunized by vaccination against enteric fever.

Digestive System.—The appetite is completely lost, but the patient does not suffer from excessive thirst. The tongue is coated centrally, the tip and margins are clean; a slight sore throat is occasionally present. At the onset of the fever the patient may vomit, but this is a rare occurrence; the abdomen is somewhat distended, the liver slightly tender, and the spleen is occasionally to be felt. Diarrhœa or constipation may be present, but the tendency is to have the bowels confined.

Circulatory System.—The heart shows nothing to note, the pulse-rate is in correlation with the temperature for the first twenty-four or forty-eight hours, and is often full and bounding, after which the rate is diminished. Bradycardia is present at the end of the fever, and during the early days of convalescence.

Respiratory System.—The respiratory system does not appear to be affected in this disease; a mild double basal bronchitis is sometimes present, and respiration is slightly increased during the first forty-eight hours of this fever.

Clinical Examination of the Blood.—The examination of the blood as a method of diagnosis shows nothing pathognomonic of the fever. From a careful study of the blood of twenty-five cases of undoubted seven-day fever the following results were obtained:—

It was found that in eight cases the blood content was normal; in nine cases the total number of red and white corpuscles was slightly reduced. In the remaining eight a differential count showed the polymorphonuclear cells reduced, while the larger mononuclears (and to a lesser extent the small mononuclear cells) were relatively increased; of the latter eight cases three had a previous history of fever, which may have been malaria, and would help to explain the large mononuclear increase.

The Skin.—In a clinical examination of fifty cases the skin was smooth and sweating; rashes were noticed on two cases, the eruptions appearing all at once on the fourth and fifth days respectively. In both cases the eruption resembled a mild, typical, morbilliform rash, which disappeared before the temperature was normal, and was unassociated with itching or desquamation.

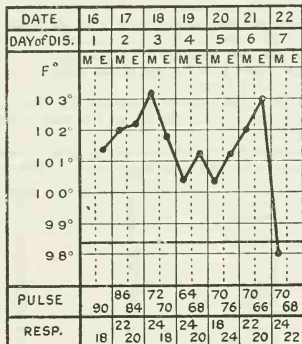
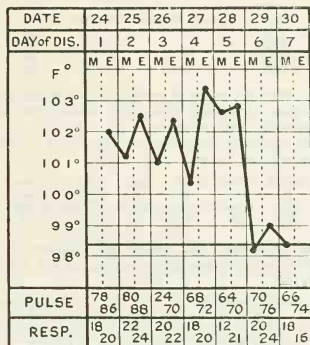
Nervous System.—Patients suffering from "seven-day fever" invariably have a severe frontal headache, and frequently complain of dull pains in the back. In the enteric-like cases the intellectual functions are somewhat dull, the cranial nerve functions normal. Delirium was present in one case.

Urinary System.—Examination of the urine shows nothing to note; a trace of albumin is occasionally present.

Temperature.—The duration of the temperature in this febricula varies considerably. In the majority of cases the fever lasts from six to eight days, but may be slightly more or less. The fever may be continuous or remittent, and is occasionally intermittent in type.

The commonest temperature charts recorded are either continuous or remittent in character.

Three charts of the fever are here shown:—

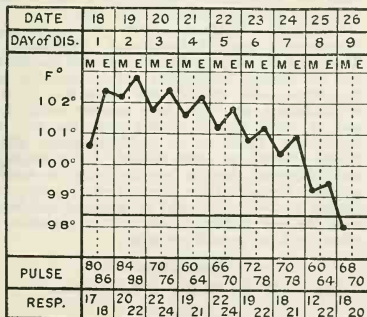


The temperature charts in this fever vary considerably; two varieties are commonly met with. One in which there is a continual daily fall in the temperature from the day the fever reaches its maximum until it becomes normal.

A second variety in which the so-called saddle-back temperature is seen, and where the temperature rises suddenly from 100° F. on the fifth day to 105° F. on the sixth day, followed by a fall to normal on the evening of the seventh day.

Diagnosis.—Seven-day fever has to be differentiated from malaria, dengue, enterica, relapsing fever, sand-fly fever, and influenza.

In the annual returns the following is the number of admissions for pyrexia of uncertain origin amongst the British troops at Aden for the years 1908-1912:



Year		Cases
1908	Pyrexia of uncertain origin	215
1909	" "	153
1910	" "	92
1911	" "	36
1912	" "	29

In 1908, 215 cases of pyrexia of uncertain origin, two cases of enteric fever, and seventy-two cases of malaria were recorded.

The monthly incidence of pyrexia of uncertain origin was as follows:—

January	February	March	April	May	June
1	0	3	8	11	68
July	August	September	October	November	December
64	28	12	12	8	0

The following table shows the number of days the temperature was above normal in the different cases:—

Number of days' fever	Number of cases
1 to 4 ...	143
5 " 7 ...	54
8 " 10 ...	11
10 and over ...	7

From the examination of the temperature charts of these patients, it was found that the fevers were either phlebotomus fever or seven-day fever. In June and July sand-fly fever was epidemic. Many of the charts were typical of the different varieties of seven-day fever.

In 1909, 153 cases of pyrexia of uncertain origin, three cases of enteric fever and 470 cases of malaria were returned.

The monthly incidence of the pyrexia of uncertain origin and malaria was respectively as follows:—

	Pyrexia of uncertain origin	Malaria
January ...	2	30
February ...	2	18
March ...	3	19
April ...	6	32
May ...	19	53
June ...	15	62
July ...	11	81
August ...	15	68
September ...	34	40
October ...	39	25
November ...	5	25
December ...	2	17

The duration in days amongst the different cases of pyrexia of uncertain origin was as follows:—

Duration of fever in days	Number of cases
1 to 4 ...	87
5 " 7 ...	49
8 " 10 ...	14
10 and over ...	3

On examination of the temperature charts, several, varying from six to eight days' duration of pyrexia, were characteristic of seven-day fever.

The temperatures of short duration were typical of sand-fly fever.

The large malaria incidence shown this year was due to the epidemic of that fever in India, the troops being infected before arrival at Aden.

In 1910 ninety-two cases of pyrexia of uncertain

origin, three cases of enteric, and seventy-seven of malaria were recorded.

The monthly incidence of the pyrexia of uncertain origin was as follows:—

January	February	March	April	May	June
0	8	7	8	2	9
July	August	September	October	November	December
21	20	5	7	3	2

Sand-fly fever was very prevalent during July and August, but the temperature charts show several cases of seven-day fever between October and April.

In 1911 thirty-six cases of pyrexia of uncertain origin and thirty-five cases of malaria were recorded.

The monthly incidence of the pyrexia of uncertain origin was as follows:—

January	February	March	April	May	June
5	0	0	13	3	3
July	August	September	October	November	December
4	3	1	3	0	1

In 1912 twenty-nine cases of pyrexia of uncertain origin, three cases of enteric fever, and twenty-four cases of malaria were recorded.

The monthly incidence of the fever was as follows:—

January	February	March	April	May	June
2	2	0	0	1	4
July	August	September	October	November	December
4	3	3	6	2	2

During the years 1911 and 1912 seven-day fever does not appear to have been prevalent amongst the British troops at Aden.

Through the courtesy of Captain M. D. A. Kureishi, I.M.S., I have examined the hospital records of the 18th Indian Infantry, stationed at the Crater, Aden. From the arrival of the regiment on January 12, 1912, to December 31, 1912, 108 cases of pyrexia of uncertain origin were admitted to hospital; during June and July sand-fly fever was epidemic in the regiment, and during May and June the temperature charts showed that a few cases had suffered from seven-day fever.

The Disease Incidence and its Relation to the Temperature and Entomological Conditions.—There may be some relationship between the fever and the climatic temperature and the humidity of the atmosphere; possibly the connection is an entomological one. The fever appears about the end of April, and is present until the end of September. There are no anopheles nearer than Shaikh Othma, ten miles distant. *Culex fatigans* and *Stegomyia fasciata* can be found in small numbers throughout the year, chiefly breeding in shallow brackish wells, and in increased numbers from the end of May to the end of September, when the fever is most prevalent.

REFERENCE.

ROGERS: "Fever in the Tropics," Second Edition.

PLATE.

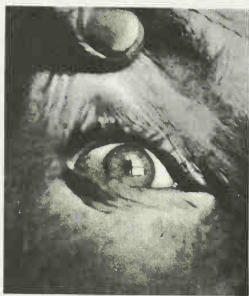


FIG. 1.



FIG. 2



FIG. 3.

OEDEMA OF THE EYELIDS CAUSED BY ANTS.

By ALBERT J. CHALMERS, M.D., F.R.C.S., D.P.H.

Director, Wellcome Tropical Research Laboratories,

AND

ALEXANDER MARSHALL.

Senior Bacteriological Laboratory Assistant, Khartoum.

In our paper entitled "Notes on Minor Cutaneous Affections seen in the Anglo-Egyptian Sudan," published in this Journal on October 1, 1918, we invited attention to oedema of the eyelids occurring in Europeans and natives in Khartoum.

We suggested that these swellings were caused by the bites of ants and we gave illustrations of the affection and of the ant which we thought to be the causal agent and which, according to entomological authorities, is named *Monomorium bicolor subspecies nitidicentre*, and by natives of the Sudan *Darra*.

We were unable, however, to prove beyond doubt that the ant was the cause of the swelling, and, for this reason, we now bring forward the following case.

The Government geologist, Mr. Grabham, feeling some pain in his upper eyelid, during the course of a night, examined this eyelid as soon as daylight appeared.

He detached from the eyelid the body of a small ant (fig. 3) and kindly left the head (fig. 2) *in situ*, knowing our interest in the question of the causation of the oedema of the eyelids which he saw present.

When seen during the morning, there was swelling similar to that depicted in fig. 4 of the paper mentioned above.

When he came to us, the head of the ant (fig. 2) could be clearly seen attached to the eyelid (fig. 1) as a small black dot.

The head was easily removed by a fine pair of forceps and mounted, forming fig. 2 of the present communication, while the body forms fig. 3. The only difference between fig. 3 and fig. 5 (a) of our previous communication is that, in the latter, pressure has separated the divisions of the abdomen, while in the present fig. 3 they are shown in more natural position.

On removing the head, the irritating sensation and the swelling quickly subsided.

This case appears to us to prove that the bite of the ant is the cause of the oedema of the eyelids, which is so commonly met with here and of which the cause was previously obscure.

We beg to express our gratitude to Mr. Grabham for so kindly assisting in clearing up this little question.

Khartoum,

March 9, 1919.

REFERENCE.

CHALMERS and MARSHALL (1918): JOURNAL OF TROPICAL MEDICINE AND HYGIENE, October 1, vol. xxi, pp. 197-200.

ILLUSTRATIONS.

FIG. 1.—Photograph showing the ant's head attached to the upper eyelid. It is the black dot indicated by the arrow. The swelling of the lid is obliterated by the skin being drawn up by the finger. Nearly natural size.

FIG. 2.—Head of the ant. This is the black dot illustrated in fig. 1. Magnified 18 diameters. Photomicrograph.

FIG. 3.—Body of the same ant as in fig. 2. Note that the abdomen is in a natural condition and not pressed out as in fig. 5 (a) of our previous communication. Magnified 18 diameters. Photomicrograph.

Amoebic Tumours in Large Intestine (E. P. Lasnier, *Annales de la Faculté de Médecine*, 1918, iii, No. 11-12).—Illustrated cases demonstrate the possibility of amoebic inflammatory tumours in the intestines, this possibility should be borne in mind, and treatment for the amoebiasis instituted before considering operative measures. The discovery of the amoeba will often confirm the diagnosis as the tumours are otherwise liable to be ascribed to tuberculosis or other causes.

Hexamine by the Vein in Spirochaetosis (A. Da Matta, *Amazonas Medico*, 1918, i, No. 4).—Treatment of Inada and Ito's icterohemorrhagic spirochaetosis hitherto has been mostly symptomatic, and the drugs have been given by the mouth. The digestive apparatus is so deranged by the disease that drugs by the mouth have little effect. Much better results can be anticipated from drugs given by the vein, and he has found hexamine extremely useful for the purpose. He dissolves, cold, 1 or 2 grm. to the 20 or 30 c.c. of sterilized water, and injects this into the blood-stream. It liberates formaldehyde at once, and is a vigorous and powerful disinfectant, destroying the pathogenic germs wherever they may lurk. This is thus a rational method of treatment for angiocholitis, colicystitis, jaundice of malarial, typhoid or spirochaete origin, and especially in hepato-renal spirochaetosis. He has found it successful in all these conditions. It is the first time, he believes, that this technique has been applied in this last-mentioned disease, and he describes in detail one of his cases to demonstrate the efficacy and harmlessness of intravenous injection of this drug. The patient was a man of 57, and the typical picture of the Inada-Ito spirochaetosis was combated with caffeine, spartein, saline infusion and cupping in the dorso-lumbar region, supplemented with 2 grm. of the hexamine in 20 c.c. of distilled and sterilized water, injected daily by the vein for four days, then suspended for two or three, and recommenced, to a total of twenty injections. When the output of the urine was practically normal, he gave sodium cacodylate. The man left the hospital quite cured the twenty-fourth day. The hexamine by the vein always increased the diuresis, and all the symptoms changed for the better. The effect of the drug is seen in the higher content of nitrogen, chlorides, &c., in the urine. There are no contra-indications.

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THE JOURNAL OF

Tropical Medicine and Hygiene

JUNE 16, 1919.

FAULTY DIAGNOSIS.

PSEUDO-ELEPHANTIASIS.

THE writer has lately had under observation several cases sent "home" from warm climates with the diagnosis "elephantiasis" attached. All

of them have come from regions where filariasis prevails. As far as is known filariæ had not been found in the blood of but one of the cases before they came under the writer's care, and in no instance have filariæ been found since. It would seem that mistakes had been made in the diagnosis and that the matter requires no further comment. This step might be one which would prove again a mistake, and the patient would be tossed from one practitioner to another with tormenting uncertainty, monotony, prolonged suspense, not to mention the mental worry attaching to the several opinions expressed. It is well known, of course, that once elephantiasis is in evidence filariæ may cease to be met with in the blood and the one-time diagnosis may have been correct, although corroboration later, owing to the absence of signs of infection, is not possible. A case, well known to the writer, is that of one of the most celebrated of Indian physicians, who, when he retired from the Indian Medical Service, developed on the way home between Gibraltar and England a thickening of the tissues of the scrotum, accompanied by "elephantoid fever" of typical character. He had no knowledge that he had filariæ in his blood before he left India. He had no means of examining his blood or urine whilst on board ship, and after reaching London no filariæ could be found in the blood. Yet the elephantiasis of the scrotum remained, and grew in size for several years until it attained large proportions. This famous man had had great experience in Calcutta of filariasis and had removed many scores of elephantoid growths. Examination of the scrotum itself presented every sign of the correctness of the diagnosis. That he did not know he ever suffered from filarial infection, and yet had it, is of course perfectly possible. The writer examined the blood of a young Englishman, aged 23, in Hong-Kong in 1890, whose blood swarmed with filariæ; and they had been found ten years previously—that is to say, ever since he was 13 years of age. He was born in Annam, and lived there always, never having left the Far East. He had never been inconvenienced by the infection, had had good health as a rule, and there were no signs of lymphoid thickening anywhere in his body. The writer again examined this man in 1912 when he was on a visit to England—that is, twenty-two years later—and found the filariæ as numerous as they were twenty-two years previously. He had a swelling about the size of a walnut over the sixth rib in the anterior axillary line, and the question arose as to the nature of the swelling. A course of mercury solved the problem, for the gumma, as it turned out to be, speedily disappeared.

This case is mentioned to show that filariæ may exist for many years, in this instance proved to be at least thirty-two years, without causing inconvenience, lymphoid thickening, or any untoward sign or symptom. It is quite possible that the case of the physician mentioned above was of like nature; that he had filariæ in his blood

for many years (he resided for forty-one years in India) is quite possible, that he had no inconvenience until he faced bitter cold weather coming up the Atlantic from Gibraltar. No. 1 of the three cases lately seen, a man of 56 years of age, was told that filaria had been found; but three other men who examined him failed to find filaria. When the writer saw him he presented an enlarged abdomen with a large quantity of fluid in the peritoneal cavity; an enlargement of the scrotum with slight thickening of the skin; a fullness along the tract of both inguinal canals which had been diagnosed as hernia. The patient himself was fully convinced he had elephantiasis of the scrotum, and nothing could shake him in his belief. No filaria were found on a blood examination. This case was obscure in several ways, but there was no evidence of its being filariasis, nor was the scrotum skin really elephantoid. It was oedematous merely at times; the so-called "hernia" was the passage of ascitic fluid down the tract of an unclosed inguinal canal, as proved by inserting a fine trocar and cannula on both sides; the ascitic fluid was drawn off many times, partly because it recurred, but chiefly because it was never possible to empty the cavity. The most that was aspirated at a sitting was ten pints, and on several occasions it amounted to a quantity varying from half a pint to five pints only, on two or three occasions the aspirating needle failed to draw off any fluid at all. This was a case of chronic (alcoholic) hepatitis with chronic peritonitis, with a great thickening of the omentum with many adhesions. The patent inguinal canals filled the tunica vaginalis on both sides with a quantity of the ascitic fluid, and the subcutaneous thickening of the scrotal tissues resulting caused the mistaken idea that it was due to filarial infection.

The second of the three cases was due to an obstruction of the groin lymphatics, the result of extensive removal of the groin glands for climatic buboes on both sides. In this case the skin and subcutaneous tissues of the penis and scrotum generally were involved, and a hardened elephantoid condition resulted identical in structure with that met with in elephantiasis due to filariasis. The tissues were removed by the usual operation for elephantiasis of these regions with successful results.

The third case was that of a man coming also from a filaria-infected region, in whom hypertrophy of the subcutaneous tissues of both lower extremities from the middle of the thighs to the lower part of the legs was present. No filaria had ever been found, and except for some stiffness on movement nothing was complained of. The feet were not involved, nor was any oedema of the tissues below the lower third of the legs present. The cause of this enlargement of part of the lower limbs has not been as yet ascertained. Elastic stockings relieved the stiffness, reduced the enlargement, and the man could walk long distances without difficulty.

Other cases of pseudo-elephantoid conditions,

ascribed to filarial infection, yet in whom filaria were not found in the blood, and due to phlebitis, have come under the writer's observation from time to time.

These cases tend to show that a diagnosis of the causes of elephantoid enlargements is not simple, and that many such thickenings of the scrotal and lower limb tissues may have nothing to do with filariasis.

Sprue.—Another disease which causes many faulty inferences is sprue. A number of cases of chronic diarrhoea due to a multiplicity of causes have within the past three years come under the writer's notice that have been diagnosed as sprue. Careful inquiry and observations have proved that these are not sprue. Several have been merely the morning diarrhoea associated with alcoholic changes in the liver; others are cases of chronic colitis the result of previous dysentery; whilst yet again some are due to threadworms. It is needless to enlarge upon these faulty inferences further than to remark that the maladies mentioned above being of a chronic character cause the patient to go from one medical man to another, and even to many, in search of a definite diagnosis. The doctor who gives a definite diagnosis, such as elephantiasis or sprue, is the one the patient is apt to pin his or her faith in, and comes "home" in search of cure, announcing the nature of the ailment with assurance. Unless the doctor at home is thoroughly acquainted with such ailments, he is apt to fall into the trap, and, relying on the diagnosis given by the patient, continues to treat a non-existent malady.

Patients are always willing to believe in the doctor who gives a definite diagnosis, be the opinion ever so faulty, and it requires knowledge and courage on the part of the "home" doctor to gainsay the diagnosis. By doing so he likely loses his patient, and allows the sufferer to fall into the hands of those who from want of knowledge or lack of courage accept the patient's statement either in real or apparent acquiescence, and proceed to treat him. In this way many reported "cures" of, say, sprue are established which never were sprue, and several drugs, such as vermicides, this and that spa treatment, are lauded, and the report handed on to others who may or may not be suffering from a similar malady.

J. C.

Leishmaniosis of Skin and Mucosae (A. Da Matta, *Amazonas Medico*, 1918, i, No. 2).—Grave forms of leishmaniosis affecting the skin and mucous surfaces were described as early as 1759. The pottery of the Incas shows reproductions of it from before the discovery of America. Certain regions in Peru seem to be the focus of the disease, but in the course of centuries it has spread from Bolivia and Amazonas to Paraguay. Popular synonyms for the disease are, besides oriental sore, uta and espundia, gallico, kjapa, tiac-araña, jaccuya, queepo and llaga.

Annotations.

Intermittent Chyluria with Malaria (G. Quarelli, *Policlinico*, March, 1919, xxvi, Medical Section, No. 3).—The case reported was of the æstivo-autumnal type, and during the febrile paroxysms the urine became milky and persisted thus for ten or twelve hours afterwards. The discovery of chyluria should suggest possibly latent malaria.

Importation of Liquid Eggs from China (A. W. Stewart, *Journal of State Medicine*, June, 1919).—During recent years the export from China of eggs in liquid form, preserved with boric acid, has developed very large proportions. Prior to the war, relatively small quantities of this material were imported into this country, but after the outbreak of war large consignments arrived at certain ports in this country as cargoes in prize ships, and since then large quantities have been imported in the ordinary course of trade. These products occasionally arrive in the form of whole egg mixed, but usually the egg yolk and egg albumen are sent separately. In the latter case the albumen may be sent in a fluid state with preservative added, or in a crystallized dried form.

Samples of yolk taken from consignments arriving in the City of London were examined by the city analyst and found to contain boric acid in amounts varying from 1.35 to 2.08 per cent. When boric acid is relied on alone for preservative purposes, the amount aimed at appears to be 2 per cent. Sometimes, however, common salt up to 10 per cent. is used with a smaller amount of boric acid. It is contended that these large amounts of preservative are necessary for effective preservation owing to the length of the voyage and the passage through the tropics. Until comparatively recently the use of this liquid egg for food purposes was confined to the manufacture of cakes, biscuits, &c. When used for these purposes, the amount of boric acid in the finished food as eaten is reduced to about 5 gr. per pound. During the latter part of last year, however, liquid egg began to appear on the market in large quantities packed for domestic use in small tins and jars reputed to contain the equivalent of from 9 to 12, or more, eggs. In this form the product was available to the general public for use in milk puddings, pancakes, &c., and used for such purposes the amount of boric acid consumed by the individual would be considerable. There is also good reason to believe that large quantities have for some time been used in restaurants for similar purposes. The employment of these boricized products for domestic and restaurant use is open to serious objection. In the case of the smaller receptacles sold retail, some of the packers make a statement to the effect that the contents should not be used for omelettes or scrambled eggs; but even this small measure of protection is not available to the members of the public using hotels, restaurants, and similar places.

In order to ascertain the amounts of preservatives used by the packers of these small receptacles and the veracity or otherwise of the statements as to the egg equivalent of the contents of the tin, an examination of a series of samples was undertaken by the Government chemist. The results showed the presence of boric acid in these samples in amounts varying from 49 to 113.4 gr. per pound. They also showed that, as compared with the composition of average genuine hen's eggs, the preparations contained added water, some of which was probably due to the addition of boric acid in aqueous solution. Another difference observed was that whereas in genuine eggs the weight of white is approximately twice the weight of yolk, in most of the samples there was more yolk than white, so much so that, in spite of the added water, the calorific value of the contents of the jars and tins fell, with one exception, within the range of that of genuine eggs.

The public health authorities of some of the districts concerned have made it a condition of allowing the importation of preserved liquid eggs that a guarantee shall be furnished by the importers: (1) that the material will be sold only to firms engaged in the bakery, wholesale confectionery, and allied trades, and that when used in products prepared for human consumption, the ultimate amount of boric acid contained in such products will be negligible in amount; and (2) that the egg will not be sold to the general public by retail over the counter, and that with a view to ensuring this it will not be put up in receptacles containing less than 7 lbs.

EUPHORBIA AND LEPROSY.

By F. R. G. S.
Late Indian Police.

As in the arrangements of Nature, the dock leaf is very often found in company with the nettle (one the remedy and the other the cause of the evil), so we may easily believe that there are other happy combinations on the same plan.

In Northern Punjab, among the "Siwaliks" or foot-hills to the Himalayas, in a dreary, fiery hot and stony land, is the home of the Euphorbia, and in this same tract of country leprosy is very prevalent.

My duties took me constantly through these parts, and the two peculiarities struck me very much, namely, the prevalent leprosy, and what seemed to me might be the cure of the dread disease, the Euphorbia.

As all know, the acrid, viscid juice of this plant is most abundant, and the very nature of it leads one, without very much imagination, to think that it may be a remedy, both as an injection and as an embrocation, and perhaps taken internally as well, a remedy as yet undiscovered.

From the fact of the very remoteness of the tract no one visits the locality, except the chief police officer of the district, which was my post.

Original Communications.

A CASE OF PENTOSURIA CONTRACTED IN THE TROPICS.

By ALDO CASTELLANI, M.D., M.R.C.P.,

Member Permanent Committee Inter-Allied Sanitary Commission,

AND

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Lecturer on Bacteriology, King's College, University of London.

SOME time ago one of us was consulted by a planter, 38 years of age, who had been sent home from a tropical country in the Far East, with the diagnosis of "diabetes." His general condition, however, was fairly good and according to what he said he had not lost much weight. According to his statements he was not very thirsty or very hungry, nor did he feel very weak. He appeared, however, somewhat nervy and irritable, and was very worried at the idea of suffering from diabetes. The urine passed during the 24 hours varied between three and four pints. It was slightly acid, density 1020. It persistently reduced Fehling well, and apparently the diagnosis of diabetes had been based on this fact.

The urine was examined according to our "parallel mycological method" [1 and 2] for presence of the following Fehling-reducing carbohydrates: glucose, levulose, galactose, maltose, pentose, lactose. The patient was made to pass urine into three sterile vessels; the urine of the second vessel was distributed immediately by means of a sterile pipette in six tubes of peptone water (about two parts of urine to one of peptone water) each containing a fermentation tube. The tubes were labelled Nos. 1 to 5. Tube 1 was inoculated with *Monilia krusei* Castellani; Tube 2 with *M. pinoyi* Cast.; Tube 3 with *M. metalondinensis* Cast. Tube 4 with *B. coli* Escherich, Tube 5 with *B. paratyphosus* B Schottmüller. The five tubes were placed in the incubator at 37° C. and examined after 48 hours. The following were the results:—

(Tube 1) <i>Monilia krusei</i> Cast.	O
(Tube 2) <i>M. pinoyi</i> Cast.	O
(Tube 3) <i>M. metalondinensis</i> Cast.	O
(Tube 4) <i>B. coli</i> Esch.	+
(Tube 5) <i>B. paratyphosus</i> B. Shott.	+

According to our method (see *Brit. Med. Journ.*, December 29, 1917) these results in a Fehling-reducing urine mean presence of pentoses.

The result obtained by our mycological test was confirmed by chemical investigation. The urine which reduced Fehling well and Nylander solution very little, gave a positive reaction for pentoses using Bial's and Read's modifications of the orcein test. There can be little doubt, therefore, in our opinion that the patient was suffering from "pentosuria" and not from diabetes. It is important in practice to try to differentiate in every

case between glycosuria and pentosuria, as the first condition is often of grave prognosis, while the second points to a much more benign disturbance of metabolism and practically requires no treatment. We are inclined to believe that our method will facilitate making such a differentiation a matter of routine.

ADDENDUM.

For the reader's convenience we quote here some of the principal mycological formulae which we have devised and employed for the detection of certain sugars and other carbohydrates in pathological urines.

URINE FEHLING-REDUCING.

(1) <i>Monilia balcanica</i> Castellani	+	= Glucose
(2) <i>M. balcanica</i> Cast.	O	= Levulose
<i>M. krusei</i> Cast.	+	
(3) <i>M. krusei</i> Cast.	O	= Maltose
<i>M. pinoyi</i> Cast.	+	
(4) <i>M. pinoyi</i> Cast.	+	= Maltose
<i>M. parachalmeri</i> Cast.	O	
(5) <i>M. pinoyi</i> Cast.	O	= Galactose
<i>M. metalondinensis</i> Cast.	+	
(6) <i>M. pinoyi</i> Cast.	O	= Galactose
<i>M. parachalmeri</i> Cast.	+	
(7) <i>M. metalondinensis</i> Cast.	O	
<i>Bacillus coli</i> Escherich	+	= Pentoses
<i>B. paratyphosus</i> B Schottmüller	+	
(8) <i>M. pinoyi</i> Cast.	O	
<i>M. parachalmeri</i> Cast.	O	= Pentoses
<i>B. coli</i> Escherich	+	
<i>B. paratyphosus</i> B Schottmüller	+	
(9) <i>B. coli</i> Escherich	+	= Lactose
<i>B. paratyphosus</i> B Schottmüller	O	

URINE NOT FEHLING-REDUCING.

(1) <i>B. coli</i> Escherich	O	= Saccharose
(2) <i>B. pseudocoli</i> Cast.	+	
<i>M. pinoyi</i> Cast.	O	
<i>M. rhoi</i> Cast.	+	= Saccharose
(3) <i>B. paratyphosus</i> B var. M. Schottmüller	+	
<i>B. paratyphosus</i> A Schottmüller	O	= Inosite

+, Production of gas (simple acid fermentation is not taken into account).

O, No gas.

All the above formulae are easily understood when the biochemical reactions of the various germs used are kept in mind. These reactions may be found in papers published by one of us, among which was one which appeared in this Journal in August, 1917.

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AN ACQUIRED CRANIAL DEFORMITY.

By Captain P. M. BRETT, M.B., R.A.M.C.

Attached the Egyptian Army.

THERE are many curious customs among the native peoples of tropical Africa, and therefore it may be interesting to note that among the Mombettu tribe of Bantu Stock which lives in the Haut-Uele district of the Belgian Congo the mothers artificially deform their infants' heads.



It is their custom to compress the child's head by tight bands made of fibre.

As the little skull grows it assumes the elongated shape depicted in the illustration.

This deformity remains when adult life is attained and becomes a distinctive feature of the tribe.

Khartoum,

March 15, 1919.

A FEW NOTES ON "BOSCH-YAWS," THE DERMAL LEISHMANIASIS OF DUTCH GUIANA.

By E. BONNE.

Bacteriologist, Government Hospital, Paramaribo.

"BOSCH-YAWS" has been described by Flu in 1911, who showed clearly that it has nothing to do with yaws, but that it represented a leishmanial skin infection.¹ As a rule the patients showed one or more ulcers on the uncovered parts of the body.

A Lymphatic Type of the Disease.—Flu does

not mention this, but I observed cases where, e.g., a few ulcers were present on the back of the hand, and at the same time several places of cutaneous infiltration and small subcutaneous nodules along the course of the lymphatics of the arm. The bicipital lymphatic glands were swollen also. In some of these cases I found the leishmaniae not only in the ulcers, but also in a portion of one of the infiltrations, excised for the purpose. This lymphangitic type of dermal leishmaniasis is also mentioned by other observers in South America (e.g., Escomel, Migone).

Nasal Complications.—Severe leishmanial infections of the nose, mouth and throat are described from other parts of South America (Espundia, Uta). It is somewhat difficult to understand whether they must be looked upon as a primary infection or as secondary manifestations of a leishmanial disease.

In Dutch Guiana I saw nasal complications develop in the course of ordinary bosch-yaws. Sometimes there were only a few crusts in the nose and some discharge, sometimes a few small ulcerating nodules could be seen on the sputum or at the nostrils, sometimes even developing into a small tumour-like mass. I found leishmaniae in these ulcerations, but they never gave rise to dangerous symptoms. This proves that the severe leishmaniasis of the mucous membranes, if present in Dutch Guiana, is exceedingly rare, because it is almost sure that these patients would come to the hospital in Paramaribo for treatment. I cannot say whether the nasal symptoms which came under my observation, and which sometimes developed during treatment in hospital, were due to inoculation by the patient's fingers from the skin lesions, or whether they were secondary symptoms, comparable to the secondary and tertiary lesions of yaws and syphilis.

A Pseudo-elephantiasis Type of the Disease.—I saw two patients, each with one of their legs below the knee nearly completely covered with large verrucous patches, with a thick horny layer on some parts and showing defects of epithelium on other parts. The leg was swollen, but the skin between these patches was normal, and they certainly were not cases of elephantiasis. This condition had been present for a few years; it was called bosch-yaws by the patients themselves, but I found no leishmaniae, and I cannot prove it to be real dermal leishmaniasis. The disease, however, was contracted in the woods in the interior of the country, as is the case with bosch-yaws, and neither could I find another parasitic cause.

Cultivation of the Parasites.—Several times I succeeded in cultivating the parasites on N.N.N. agar prepared with rabbits' blood. They develop into *Leptomonas* forms, which can be found in the water of condensation, sometimes as soon as the second day. Instead of blood of the rabbit, blood of the guinea-pig can be used also. They do not develop well on N.N.N. agar prepared with human blood. I could not find any difference with the

¹ Die Aetiologie der in Surinam vorkommenden sogenannten "Bosch-yaws," einer der Aleppobeule analogen Erkrankung, *Centralbl. f. Bakt., etc.*, 1, Abt. Orig., Bd. 60, Heft 7.

Leptomonas forms cultivated from cases of oriental sore.

Cultivations from the peripheral blood were negative.

Sometimes the parasites can be demonstrated by cultivation, when it is impossible to find them in microscopical examinations of smears. In a lymphangitic case of *bosch-yaws* a portion of a cutaneous infiltration was excised, and tubes with N.N.N. medium inoculated with small parts of it. After six days *Leptomonas* forms were present. Smears made from this same tissue were negative in several examinations, repeated after the parasites had been found in the culture tubes. So under certain circumstances cultivation on a suitable medium is the best means of diagnosis.

The natives of the country hold a few thorny lianas responsible for the disease, and they say that the wounds made by their thorns develop into *bosch-yaws*. This is not altogether impossible, because *Leptonomads* have been found in the latex of some plants (*Leptomonas davidi*). I made a few scratches on my skin with the thorns of these lianas, and rubbed them in with the latex more than a year ago. No *bosch-yaws* has developed. I could not find flagellates in the latex.

Flu supposes that ticks may hide on these plants, who act as transmitters of the disease. One of the patients told me that he pulled off a tick from his ear on a spot, which became later the site of a leishmanial nodule.

Intestinal Schistosomiasis (A. Da Matta, *Amazonas Medico*, 1918, i, No. 2).—This is the first case of the kind that has been diagnosed in Amazonas. Intestinal pains, congestion of the liver, jaundice and alternating constipation and diarrhoea were explained by the lateral-spined ova of the schistosomum in the stools. The snails, the intermediate hosts of the parasite, are common at Manáos.

Contagious Lymphangitis in Horses.—(M. Belin, *Bulletin de l'Académie de Médecine*, 1919, lxxxi, No. 11.) 1,500 horses with bacillary lymphangitis and 400 with cryptococcus lymphangitis, were treated with pyovaccine. This proved successful in about 75 to 98 per cent. of the cases. It is superior to all other procedures applied to date while not conflicting with any of them. The vaccine is made by agitating vigorously pus, taken from ripe abscesses, with four parts of ether. It is set aside for twenty-four hours, agitating occasionally. Then as much boiled water is added as was used of the ether, and the pyovaccine is ready for use. In recent cases of cryptococcus lymphangitis, 2 c.c. is injected in series of seven daily injections, then in twelve or fifteen days the next series. With bacillary lymphangitis, 3 c.c. is used in four daily injections, followed by one every five or six days.

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AN INTER-ALLIED FLOATING (TRAVELLING) SCHOOL OF TROPICAL MEDICINE.

In the *British Medical Journal* of June 28, 1919, attention was drawn to a paper read by Dr. Louis Sambon at the Royal Society of Medicine on June 19, 1919, on the benefits likely to accrue from the formation of a Floating School of Tropical Medicine, whereby expeditions amply equipped would visit tropical countries from time to time for investigation, scholastic and hygienic purposes. Dr. Sambon stated that he had already broached the subject to scientists and others interested in the diseases of the tropics in both France and Italy, and the idea was given a cordial reception. At the end of the admirable address he gave before a crowded audience, Sir James Cantlie, F.R.C.S., proposed, and H. S. Wellcome seconded, that a committee be formed to further the idea of "An Inter-Allied Floating School of Tropical Medicine" forthwith.

Dr. Sambon's idea is to carry science in the shape of a staff of experts of various nations with fully equipped laboratories to the tropics, and there deal directly not only with the diseases themselves, but to study their causes and the means of thwarting them at the places where the diseases exist. Our tropical schools—in Britain, in France, in Italy, and in the United States of America—suffer from the want of "material"; not only in the shape of clinical material, but the factor of environment is absent and all that this absence implies, be it climatological, geological, botanical, zoological, or racial.

Dr. Sambon's plan is to take a specific portion of the vast region to begin with, and he proposes that the Lesser Antilles islands be made the initial seat of investigation. As he wisely says, an island, such as Barbados or Trinidad, or Martinique, affords a definite object for study, as its endemic ailments are less liable to contamination from without than in a district where there is only an artificial separation—a national land boundary in place of a maritime. Here any single disease can be pursued to the very fountain-head of its origin, be it in the study of the island's fauna and flora, its geological formation, or the racial origin and habits of its people.

The staff of such an expedition should consist of not only clinicians but of experts in many departments of study, including dermatology, ophthalmology, pathology, bacteriology, parasitology, hel-

minthology, botany, zoology, entomology, epidemiology, geology, and even in veterinary work. The list is a long one, but anyone acquainted with the wide field of modern tropical medicine will not regard it as such. Some diseases, for instance, are not present owing to the geological formation of the land, which in turn decides the plant and animal life of the neighbourhood, thus affecting the carriers of disease, the parasitic life in the district, and consequently the disease itself. So allied and intricate are the factors of disease, that in following their origin and possible extermination no branch of science can be unrepresented. Although climate is not held to be a factor in rendering a place unhealthy, still we have several diseases, such as rheumatic fever, scarlet fever, &c., which disappear as the tropics are reached, and yet again several diseases which become rife as the temperate zone is approached, it would seem necessary to add a climatologist to the already long list.

In addition to the heads of departments it is essential to have trained assistants, not only laboratory attendants, but students who, after an education in the schools of tropical medicine, can act as scientific workers with their departmental chief, and thus facilitate the laboratory and clinical work under his direction. Students who avail themselves of such an opportunity will obtain what they can never obtain in schools remote from the tropics. The clinical material in such schools is, and always will be, limited to a degree, and although the theoretical and the laboratory training is perhaps better obtained in a temperate climate, clinical experience can only be gained where material is plentiful, and where the tropical diseases are prevalent and acute.

Another phase of usefulness is the vivifying effect visits of the kind would have upon the local medical men and medical societies. These men, often excellent clinicians and keen observers, will be aided in their desire for help in many directions. They are often hampered in their work by local boards, by men ignorant and prejudiced, to whom the cure of disease is the only field of view, and the hospital where patients are relieved of their sufferings the be-all and end-all of their views in dealing with disease. Prevention is beyond their horizon and a matter of theory which does not come directly into the hospital accounts, nor does it come into the only view of medicine they take, viz., "a cash across the counter" procedure. One does not blame these "local bodies"; they are doing their duty as they see it, they are keeping down expenses even to the sacrifice of hospital efficiency, and therefore they consider they are good business men to have on a committee. The doctor is their servant, and in many cases their very "humiliated" servant, who must be content with what they give him, which is often in the spirit of "give the poor dog a bone." Were the irrisidiction they serve to be visited by an inter-Allied group of scientists, it would be the doctor that would be first sought out for conference with, not the local bodies themselves. Part

of the visitors' business would be to "convert" the members of the local committee, especially the chairman, by explaining the meaning and importance of research and of preventive medicine, to point the way and state the direct benefits to be derived from following hygienic precepts commercially, politically and personally. It would be well to include an orator on the staff of the equipment of the expedition, for without educating the people permanent benefit will be evanescent and hopeless.

The idea brought forward by Dr. Sambon in the interests of science and of mankind will be supported. It is another "Challenger" expedition, but in the contemplated imitation of that great and historic voyage in search of knowledge the issues are greater, the purpose has even a higher aim, for it is fraught with direct benefit to mankind in most neglected quarters. Science would be advanced in a superlative degree, the diseases that decimate humanity would be fought at their source, and thwarted in the evils they create and the sufferings they entail. Food would become cheaper, more labour would be available for tilling the soil and for the cultivation of valuable tracts now lying waste and unproductive. It is disease that limits expansion; it is the enormous disease-rate that renders food more expensive, for the numbers that have to be employed on account of the high rate of sickness have to be multiplied three-fold at least. An expedition in some parts of West Africa, for instance, has to employ three times the number of bearers actually required to carry goods, &c., owing to the illness due to attacks and illness caused by Guinea-worm alone. The consequence is that all products, and they are many, being conveyed to the coast from the interior cost three times as much as they would were even this one disease eliminated from amongst the many ailments that prevail. The detriment due to several diseases in the tropics is not to be judged by the official death-rate published; for malaria and anchylostomiasis, to name two only, incapacitate for the most part rather than kill. Malaria incapacitates for a few days or a few weeks at a time, with spells of health between. Anchyllostomiasis gradually drains the strength, and the sufferer succumbs under the burden of hard work. Each in its way necessitates relief parties to carry on the work, and so the price of labour affects directly the price of the goods they handle. It is not difficult, therefore, to prove to the employer, the firm in London, Liverpool, or elsewhere in Britain, that the benefits likely to accrue from an expedition of the kind proposed by Dr. Sambon are important and far-reaching.

The writer well remembers the spirit in which a proposal made by Dr. Sambon was received in the year 1899, when the formation of a School of Tropical Medicine was first thought of in Britain. He argued then that it should take the form of a floating school and laboratory instead of setting up an establishment on shore, for even at the Albert Dock in the heart of the shipping the cases of tropical ailments coming there would be too few

to supply material sufficient to teach from, or for investigation purposes. Such a departure from the legitimate teaching of medicine, as by means of a floating school as Sambon then proposed, was received with the hilarity which the ideas of an advanced thinker usually are when first broached; it has taken twenty years for Dr. Sambon's proposal to be treated as other than a dream, but at the meeting in June, 1919, in the British temple of medicine, it was received with sympathy, approval and acclamation. Let us hope it will not be twenty years more before it finds a fruition and a practical issue.

The idea of a floating laboratory is not altogether new. It was to be seen on the Nile some few years ago, where Mr. H. S. Wellcome instituted a laboratory of the kind, and placed it under Dr. Andrew Balfour, D.S.O., C.B., then Director of the Wellcome Bureau of Scientific Research at Khartoum. The Nile boat afforded unique opportunities for observation and study, and more than justified its existence. The idea of this extension of a laboratory of the kind to ocean purposes is a step for which we have a precedent, and the fact that Mr. H. S. Wellcome seconded Sir James Cantlie's proposal for the formation of a committee to go into the question is a proof that the original attempt on a larger scale is a testimony which stamps the idea as no mere fad, but as a practical measure of scientific importance and real usefulness.

A preliminary meeting to discuss the steps to be taken is to be held on July 8, when it is to be hoped success will attend the deliberations. We would recommend, whatever is done, that the "body" constituted to advance the interests of this floating (travelling) school will preserve its identity and become established as an independent entity.

Abstract.

MALARIA DURING THE WAR.¹

By G. PAISSEAU.

THE epidemic of malaria which broke out in the armies operating in Macedonia will probably rank high among the great military epidemics known to history. Such an outbreak, occurring as it has in so unhealthy a country as the Balkans, and under the circumstances peculiar to a great army in the field, could not fail to create a striking impression and to give rise to serious investigation. Like so many other exotic diseases, it has made its appearance during the great war at the very time that

a large number of medical men have been in a position to recognize and to study it.

It is proposed here to attempt a summary of the researches on malaria carried out by French medical officers, with reference almost exclusively to the malaria of Macedonia.

SEVERITY OF THE MACEDONIAN MALARIA.

From the very onset of the epidemic all the medical officers laid special stress on the severe type of the disease.

Professor Laveran has rightly remarked that this peculiarity was well recognized by military epidemiologists. Among numerous instances he recalls the well-known epidemic of "Walcheren fever," which decimated the British Army in 1808.

Armies in the field obviously provide all the circumstances favouring a virulent malarial infection: the soldier is forced to take up insufficiently protected quarters in very unhealthy districts; he is over-fatigued and often badly fed; thus he is exposed to particularly virulent infection at a time when his resistance is below normal.

We are driven to assign a predominant rôle to the exceptional intensity of the virus in Macedonia during the summer of 1916. In addition to the fact that the troops had to be stationed in districts where anophelines were innumerable, it must not be forgotten that the hospital centres, at any rate so far as the French Army was concerned, were also situated in very unhealthy regions. The best-known example of this in the Army of the East was afforded by the hospitals at Vertékop—the translation of which is "fever of the head"—maintained there in spite of the personnel being as much attacked by the disease as were the patients. In short, from the front right down to the base at Salonika not a single patient was safe from risk of infection, whether during his evacuation to the base or during his treatment there. It can be realized that the repeated and continued inoculation and reinoculation played a predominant part in the severity of type exhibited by the disease.

The serious feature which chiefly struck the medical officers detailed to treat malarial patients in Macedonia was the resistance of the infection to specific treatment by quinine. This is, of course, a well-recognized characteristic in all severe infections with malignant tertian malaria. It is to be found also in North Africa, where we have come across numerous examples of resistance to the drug.

Malaria in Macedonia during the summer of 1916 showed its severity particularly in the considerable proportion of cases with an initial fever of typhoidal type, in the equally large number and early onset of grave complications of all varieties, in the altogether exceptional frequency of acute and early cachexia, and, finally, in the quite abnormal series of complications found only in subjects who are steeped in malarial infection. This explains the abundance and the interest of the clinical notes published on the subject.

¹ Abstracted from the *Lancet*, May 3, 1919.

CLINICAL STUDIES.

In 1916 the earliest cases of primary fever occurred during the second ten days of June. This agreed with Sir Ronald Ross's forecast, made in November, 1915, as a result of his mission to Macedonia, to the effect that malaria would commence on June 15.

All the medical officers lay stress on the severe type of these primary attacks, which very often assumed the form of continued fever of typhoidal type. The initial symptoms in primary attacks are the violent onset of fever and varieties of pain—headache, backache, aching lower limbs, profound weakness, digestive and very frequently respiratory troubles, and rapid increase in size of the spleen. The various clinical types in such primary attacks are: gastric disturbance due to pyrexia, continued fever, quotidian remittent fevers, and mild types attenuated to a mere febrile malaise.

Certain constant symptoms of malaria were manifested with exceptional severity, as, for example, anemia. The anemia associated with primary malaria shows in addition to the normal type a certain number of rare varieties, such as pseudo-leukemic anemia, pernicious anemia, and certain hemorrhagic forms, particularly remarkable in that the anemia was accompanied not only by purpura simplex, but by purpura hemorrhagica with epistaxis, hematuria, &c.

Malarial cachexia is usually the final result of a much-prolonged infection, but in the exceptional circumstances in Macedonia it has been fairly common to find patients dying of premature cachexia after only a few weeks of illness, during the course even of a primary infection. This phenomenon corresponds with that described under the name of *hydræmic cachexia*. It is characterized by a severe anemia, accompanied sometimes by edema unassociated with albuminuria. The asthenia is profound, and the digestive disturbance, diarrhoea, and vomiting often intractable. The fall in arterial blood-pressure is frequently conspicuous. This condition may result from the association of progressive anemia with suprarenal and hepatic insufficiency.

The *intestinal symptoms* were most often represented by crises of bilious diarrhoea accompanying the bouts of malaria. The bout was sometimes represented by diarrhoea alone. At other times a dysenteric diarrhoea was encountered, its distinction from true dysentery being difficult.

Peripheral circulatory disturbances were frequent and were observed in all degrees, from erythromalgia to symmetrical asphyxia of the extremities, passing sometimes into symmetrical superficial gangrene (Raynaud's disease). A case of bilateral gangrene of the lower extremities is reported.

Diffuse and confluent erythema, usually morbilliform, sufficiently often seen to be regarded as a normal symptom of malaria. Jaundice, pulmonary complications, and acute nephritis were also noted and studied in the course of this outbreak.

Malignant Attacks.—Malignant attacks occurring

in Macedonia during the summer of 1916 were remarkable not only for their large number, but also for the variety of their clinical forms. Side by side with the classical comatose cerebral type were to be found other rarer varieties: convulsions, coma with hemiplegia, paraplegia, or aphasia; algid types simulating cholera, bilious types, and bilious hemoglobinuria. It has been possible to draw certain conclusions from these facts.

Acute adrenal inflammation in the production of the algid types is demonstrated by histological investigations. Patients who had succumbed to this variety of the disease showed very important lesions, sometimes degenerative, sometimes hemorrhagic, of the adrenal capsules, which at the same time showed a great accumulation of hæmatozoa. The clinical conditions can be correlated exactly with the adrenal insufficiency, the profound asthenia, the arterial hypotension ending in progressive heart failure, the phenomenon of the "tache cérébrale," the profuse vomiting and diarrhoea, and the abdominal and lumbar pain.

This adrenal syndrome is sometimes less pronounced, as in certain cases of malarial asthenia in which the patient can scarcely stir through weakness and the arterial tension is very low, the condition improving only very slowly.

Finally, and more rarely, pigmentation of the skin and of the mucous membranes is noted, the picture then being one of true Addison's disease. Adrenal insufficiency appears therefore to play an important part in malignant malaria.

Meningeal symptoms are sufficiently frequent in malaria for an actual *malarial meningitis* to be described. At first, in the mildest degree, there may be only a change in the cell content of the cerebrospinal fluid; at a more marked stage clinical meningeal symptoms of a more or less pronounced character occur. Finally, the malignant convulsive type is accompanied almost always by meningeal symptoms dominating the clinical picture; for example, stiffness of the neck, contractures, Kernig's sign, and marked cytological reaction of the cerebrospinal fluid—so that this variety may be considered as a true acute meningitis.

Numerous cases of *bilious hæmoglobinuria fever* were observed and studied in Macedonia. No definite conclusions have been reached as to its much-discussed etiology. The majority of French writers admit its malarial origin, but some dispute and others admit the influence of quinine in its production. It may be due to a rapid and simultaneous destruction of red corpuscles and of parasites. Hæmoglobinæmia has been observed in a certain number of cases, but the taking of the blood occurs at a very early stage and disappears quickly.

SECONDARY MALARIA.

The persistence of complications among malarial patients repatriated from the Balkans has afforded opportunities, especially in France, of studying the secondary complications of the disease.

There are different *types of fever*, commencing with the first relapse, and the interminable quotidian or tertian cycles, and the series of grouped attacks occurring at first each week, then once a fortnight, and then once a month. Subfebrile states occur in malarial patients apart from the true febrile attacks. This is proof of insufficient treatment with quinine.

Complications affecting the sense organs occurred fairly often. *Affections of the larynx* were motor in character, paralysis of the muscles of the glottis resulting in aphonia. *Ocular affections*, such as keratitis, iritis, and very frequently hemianopia, depend on the nervous mechanism. Such defects of movement as occurred were dependent on the extrinsic and intrinsic muscles producing the various forms of strabismus and of errors of accommodation. Circulatory phenomena were equally frequent, notably conjunctival hemorrhages, retinal hemorrhages, and chorio-retinitis. All these complications were related to the febrile attacks as regards the time of their occurrence.

Psychical affections were extremely common among severely infected patients. Malarial psychoses are always at first confusional in type, co-existing very often with somatic nervous upset, and they occur in patients whose general health is always profoundly disturbed. These acute confusional states may pass finally into dementia, or into conditions of asthenia and depression, melancholia, mania, &c.

A few cases of rare complications have been recorded, such as mammitis, and of aeromegaly.

STUDIES IN PARASITOLOGY.

A study of the parasitology showed that Macedonian malaria was due almost entirely to the parasites of benign tertian and of malignant tertian fever, that of quartan fever being most exceptional.

The reports of the various laboratories showed that, while the parasite of malignant tertian was predominant during the summer to the extent of over 85 per cent. of the cases, it was almost completely replaced by that of benign tertian fever during the months of March, April, May, and June. This was noted both among patients in France and among those remaining in Macedonia. This fact had been well recognized, but observation on so vast a scale gave it the character of a general rule. It does not, however, appear that this phenomenon has given any conclusive evidence on the much-discussed question of the identity or duality of the two parasites upheld by Laveran.

The biology of the hematozoa may afford a very satisfactory explanation of the rhythm of the malarial cycles and of the mechanism of relapses. For example, an original hypothesis which represents the malarial paroxysm as a defensive reaction on the part of the patient. In proof of this is the destructive action of the serum towards the parasites at the end of a paroxysm. This schizontolytic crisis is related to the schizontolytic properties of the serum described by Abrami. By an improve-

ment in the technique of Ross's thick-film method of blood examination Tribondeau has made it suitable for general use in the clinical diagnosis of malaria; instead of bœmalysis by distilled water he employs alcohol diluted one-third, followed by fixation with absolute alcohol. This method preserves not only the gametes but also the young forms of the hæmatozoon, and allows of differential diagnosis of the organism in almost every case.

PROPHYLAXIS IN MALARIA.

The epidemic of 1916 gave rise to a most difficult problem—that of the value of preventive treatment with quinine—for the general results obtained raised doubts in the minds of medical officers. This measure of prophylaxis had been ordered at the right time, there was at no time any lack of quinine, and the most exact and stringent orders had been issued by headquarters. Nevertheless, even if the mortality from malaria was diminished by these precautions, the effect on the morbidity was less evident. In this must be recognized merely the confirmation of the opinion of colonial medical men, who agree in general with Craig that preventive treatment with quinine is only one of the factors in the fight against malaria, and that by itself it may be insufficient.

The Mission of Anti-malarial Prophylaxis rendered eminent service in Macedonia and obtained results of great interest in the protection of armies in the field against malaria.

TREATMENT OF MALARIA.

Quinine Treatment.—In the treatment of malaria the points to be considered are the method of administration of quinine, the time of administration, and the dosage.

As to the *method of administration*, quinine may be given intravenously, intramuscularly, and by the mouth.

The method of *intravenous injection* is generally regarded as a procedure only for exceptional cases. Its dangers appear to have been exaggerated, and the technique, consisting in the slow injection by a serum syringe of 1 gr. of quinine bichlorhydrate dissolved in 100 gr. of saline, appears capable of completely removing such dangers. The intravenous method is the method of choice in dangerous malignant attacks. On the other hand, this method is not superior to the others in its sterilizing power, doubtless on account of the rapidity of elimination of quinine introduced directly into the circulation. The indications for its use are, therefore, special and precise.

The general use of *intramuscular injections* has brought to light a certain number of difficulties. Even when it does not produce abscesses, which have, in fact, been fairly frequent and often severe, the caustic action of the quinine is painful. Although, however, this method should not be employed as a routine, nevertheless it is indicated as the only one practicable for patients with gastric irritability who are the subjects of malignant attacks.

Many writers give preference to *administration by the mouth*. Reference must be made to the opinion held as to the value of giving the least soluble forms of quinine, their efficiency being the greater because they are eliminated more slowly; the sulphate, and, above all, the alkaloid itself, being more active than the other salts. Accordingly, chronic malaria must be treated by oral administration.

The effective *dose* of quinine was generally fixed at 1 gr. per day for constant treatment. A majority, however, of the medical officers advise a dose of 2 gr., especially in infections due to the parasite of malignant tertian fever; some even advocate a dose of 3 gr. for two or three days.

The *time of administration* of quinine appears to have lost much of the importance imputed to it at a period when it was sought to make the absorption of the drug coincide with the presence in the peripheral circulation of the young parasites which are alone susceptible to it. This end cannot be attained in those cases in which the fever is continuous from the onset, as the successive generations of parasites are too numerous. The same is true at the stage when the paroxysms become so irregular that it is difficult in practice to administer the drug at the proper moment. The methods employed vary according as the case is one of primary fever, or of attacks at the so-called secondary stage of malaria.

At the onset, when the aim is to sterilize the patients by preventing the appearance of the resistant forms, the gametes, it has been usual to adopt the classic method of administering quinine in large and continued doses. Mention should, however, be made of the technique employed by Abrami, who prefers to administer the quinine in very large doses at the febrile periods only, in order to destroy in succession the generations of parasites passing into the circulation.

In secondary malaria comparatively little use appears to have been made of the method of discontinuous dosage, based on the weekly periodicity of the recurrences. The method chiefly adopted has been that advocated by which two days' treatment with 1 or 2 gr. of quinine a day is alternated with two days of injections with strong doses of cacodylate. Another way is to give 2 gr. of quinine a day for three days each week.

These methods of treatment have the disadvantage of working in the dark. For this reason the method advocated by Marchoux is of the greatest interest. It is based on the observation that the parasites pass into the blood-stream two or three days before the rigor, the delay being due to the need for their multiplication to an extent sufficient to provoke the rigor.

With regular examination of the blood at intervals of three or four days it is possible to administer the quinine at the right moment and to destroy the generations of parasites in succession as they appear in the circulation. Not only can the recurrence of rigors be anticipated, but the patients can also be rendered sterile with a minimal expenditure of

quinine. Marchoux considers that the destruction of four generations of parasites would suffice to sterilize the system.

Accessory Treatment.—In association with quinine, iron and arsenic are the standard drugs for the treatment of malaria. Medication with arsenic has been specially studied, and many writers recommend its systematic use. In France the combined arsenic-quinine treatment advocated by Ravaut, Réniaac, and de Kerdrel is specially popular. On two successive days 0.20 to 0.30 gr. of arrhénal are injected, followed on the next two days by 2 gr. of quinine chlorhydrate by the mouth. This treatment gives excellent results, and has in all cases a remarkable effect on the general health.

In arsenical medication in malaria avoid the use of atoxyl and give preference to injections of arsenobenzol. The lesions of the suprarenal glands noted in malaria justify the use of adrenalin intravenously or subcutaneously, particularly during the rigors and in weak and unstrung subjects, and especially at the commencement of infection. From the frequent evidence of suprarenal insufficiency in secondary malaria the use of adrenalin at this stage is advised.

From the aggregate of the studies published on the therapeutics of malaria there emerges the conclusion that no method of treatment is capable of producing within a short period permanent sterilization of the patient.

Three methods of treatment deserve mention by reason of their originality or of the results obtained:—

(1) Complications of primary malaria are treated by quinine in very large doses—3 gr. of quinine daily, preferably by injection and in two doses, until the temperature no longer exceeds 100.4° F.; the daily dose is then diminished to 2 gr. by injection, and is continued until the second day after the temperature has reached the normal. The originality of the method consists in the fact that the quinine is not given during the period of apyrexia, but that the sterilization is effected by successive doses at the onset of a paroxysm.

(2) (a) *Treatment with arsenic.*—Injection of 2 gr. of quinine a day for two days is alternated with the injection of 0.20 to 0.30 gr. of arrhénal for a further two days. This course is followed for one month, and if necessary renewed for three weeks longer after an interval of ten days. (b) Give six injections of arsenobenzol in a month at the rate of one dose of 0.30 to 0.45 gr. every five days, and then give a protective dose of 0.45 gr. once a fortnight, then once a month.

(3) Make a practice of examining thick blood-films twice a week; in the case of malignant tertian fever and during active stages on alternate days. If the result is positive 1 gr. of the alkaloid is given at once. It is extremely rare for an attack to develop between two examinations. These examinations are carried out in a dispensary at which the patients attend regularly. By this method it is possible to employ them on active work during the whole course of treatment.

Original Communication

LABORATORY AND OTHER NOTES ON SEVENTY CASES OF BILHARZIA TREATED AT THE KHARTOUM CIVIL HOSPITAL BY INTRAVENOUS INJECTIONS OF ANTIMONY TARTRATE.

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HEADINGS OF SECTIONS.

Introductory

Treatment of Bilharzia by antimony

Method of examination for Bilharzia

(a) Vesical

(b) Rectal

Method of giving the injection

(a) Some important observations with regard to the injection

(b) Apparatus

(c) The best time of day to give injections

Changes noticeable in the urine during the injections

One or two examples from amongst the sixty-four cases

Direct experiments confirming previous statements

Length of time ova continue to be found in the urine after death

of parent worm

Means of ascertaining when the parent worms are dead

Criticisms

(a) A dangerous drug.

(b) Tachycardia and other cardiac symptoms

(c) Fatty degeneration

Complicated cases of Bilharzia

Behaviour of the ova and miracidia towards antimony tartrate

Permeability of Bilharzia egg shells

What is the optimum dose of antimony tartrate?

Chemical analyses of antimony tartrate excreted in urine

Prophylactic action of antimony tartrate

Can the treatment be applied on a practical basis?

Steps necessary for the eradication of Bilharzia in the Sudan

Fosinophilia

Effect of Bilharzia on national physique and character

Conclusion

Appendices

(1) List of cases

(2) Chemical analyses of urine (for antimony)

INTRODUCTORY.

SPEAKING generally, bilharzia is endemic in all the Provinces of the Sudan except the Red Sea Province. ⁽¹⁾ ⁽²⁾

Our clinical knowledge of the negroid tribes

¹ From the Red Sea coast stretching inland west of the line of hills which limits the Red Sea Littoral the country is inhabited by the Bisharin (W. and N.W.) and the Hadendowa tribes (excepting such towns as Suakin and Port Sudan where the inhabitants are a mixed race and are called Suakinese). These tribes are nomads, shy and somewhat truculent, grazing their flocks and not often seeking the advice of Government doctors. We have not heard or read of a case of bilharzia amongst the natives of the Red Sea Province. There are, of course, imported cases amongst Egyptian soldiers and settlers.

² With regard to the Kassala Province, we have in the Khartoum Civil Hospital a boy from Kassala with *Bilharzia recalcitrans*. He was born in Kassala and had not been out of Kassala before he contracted hematuria. He says that many boys in the school at Kassala have hematuria. All the boys bathe in the Gash—new cases occur in the autumn, after the rains when the Gash has been in flood.

south of Goz Abu Gonia on the White Nile is limited, and we speak with some reserve, but that bilharzia does occur in the Bahr-el-Ghazal³ is clear from the fact that in 1917 we admitted to Khartoum Civil Hospital the two attendants of a NyamNyam chief who was visiting Khartoum. In the faeces of one we found *Necator americanus*, and in the faeces of the other were typical lateral-spined bilharzia ova and *Necator americanus*. (They came from the Bahr-el-Ghazal at about 41° E. long. and 4° or 5° N. lat.).

Bilharzia is not a common disease in the Sudan north of Khartoum.

Between Halfa and Khartoum the Sudan population is chiefly riverain, there being little or no rainfall. The land near the river is irrigated by waterwheels which allow of no standing water or pools. Cases occur at Halfa (30 per cent. school children infected) and in most of the villages south as far as Khartoum, e.g., Abu Hamed, Shereik, Berber, Atbara, Shendi and Gebel Gerri, &c., but it is by no means a common disease except in the Dongola Province, where there is basin irrigation in parts, as in Egypt (numerous channels of sluggish water and stagnant reedy pools).

Bilharzia does not thrive where there is simply the rapidly flowing Nile and where there are no pools, backwaters, puddles or stagnant water with vegetation.⁴ At Abu Hamed where there are a good many cases the pools left by the river after it has flowed over the cataracts are fertile places for the mollusc (Squires).

It is true that the molluscs are found in the Nile—in the shallow water near the shore where the bottom is mud—but these molluscs are seldom infected (Pekkola).

This may be due to the difficulty the miracidia have in reaching the molluscs in running water.

South of Khartoum between the two Niles is delta

³ Of the two species of mollusc which in Egypt act as the intermediate hosts of bilharzia, *bullinus* has been found at Shambe in the Bahr el Zeraf (Mrs. Longstaff),—Leiper, *Journ. R.A.M.C.*, vol. xxvii., p. 175. There is little doubt that both species of mollusc, *bullinus* and *planorbis*, are to be found along the whole courses of the Niles in the Sudan, from 16 miles north of Halfa, through Khartoum where the Blue and White Niles meet, as far as the Sudan frontiers near Famaka on the Blue Nile and Gondokoro on the White Nile. The Nile at Gondokoro is 1,525 feet above sea level. At Famaka it is about 2,000 feet. The flora and fauna are probably much the same throughout as the altitude changes so little.

⁴ That the flowing Nile itself is not dangerous is shown from the fact that the water taken from the Nile is used on houseboats (dahabieh) by tourists for bathing purposes and no harm results, also that on the Halfa-Assouan reach of the Nile, where there is no railway, officials, tourists, everybody travels by Government steamers and they use the Nile water for baths. The same may be said of the Government steamers plying regularly on the White and Blue Niles which carry hundreds of Government officials, tourists and traders yearly. We have never heard of a case of Bilharzia in a European which could be attributed to using Nile water on a steamer in the Sudan. A European official uses these baths twice daily as a rule and the journey on the Halfa-Assouan reach takes eighteen to twenty-eight hours according to the condition of the Nile. On the Blue and White Niles the period of travelling is much longer.

land, corresponding to the delta land north of Cairo between the two branches of the Nile, and there is also abundant rain; bilharzia is more common there. The cultivation is that of rain crops and during the rains large areas of land are under water, which stands in watercourses (Khors), and in certain places there are considerable areas (lakes) of stagnant water. These are not necessarily near the river Nile. Some villages in the proximity of these lakes of standing water are badly infected with bilharzia (50 per cent. of the inhabitants in some places). Up the Blue Nile we may mention Anakliha⁵ and Khor Ambaga near Singa, and Teigo in the same Province as examples. On the Dinder river Abu Hashim and Lueissa and the surrounding villages are badly infected.

Again, south of Khartoum various places on the rivers are infected and, as an example of a badly infected place on the Blue Nile, Rufaa may be mentioned. On the White Nile going south from Khartoum and Omdurman, in both of which places cases originate, Gebel Auli and Kosti occur to us as examples of bilharzia-producing places. There are many others.

Passing west from Kosti along the line of the railway to El Obeid; Rahad, Um Ruaba and other villages are badly infected with bilharzia which also occurs at El Obeid itself. These places are well away from the river and it is especially after the rainy season that the new cases occur, when there is much standing water in watercourses (khors) and pools (fouls), and the people are not dependent on the wells.

We have had cases from Shakala in Kordofan, and there are many cases in Abu Zehad, a place 100 miles N.W. of the Darfur border where there is a large lake. Cases have come to Khartoum Civil Hospital from Tagali in the Rashad District of the Nuba Mountains Province, where it is said to be common, especially amongst children.

The newly acquired Province of Darfur is not free. We have had cases at Khartoum Civil Hospital from Sheik Abu Gabr, two days journey S.E. of Toma, which is N.W. of El Fasher, and it has been reported from Sheik Abu Gabr that many people round about have the same thing (hæmaturias). These people get their water in the summer from a lake some distance from the village and they attribute the cause to walking barefooted, which appears to be very likely; they blame the sun, however, and not the cercaria of the intermediate mollusc.

But, in spite of its wide general distribution, bilharzia is not nearly so common in the Sudan as it is in Egypt.⁶ It is commonest away from the

Nile where conditions approach those found in Egypt—namely, canals and basin irrigation, forming pools and standing water with vegetation, in Egypt—while in the Sudan the rains produce areas of standing water and pools and vegetation.

Originally, no doubt, bilharzia spread from Egypt into the Sudan by the Nile route carried by Egyptian soldiers, officials and traders.⁷ Egyptian garrisons and Egyptian civil officials and settlers are responsible for its getting a foothold in many places up the White and Blue Niles, and traders possibly carried it from Assiut to El Fasher (Darfur) along the Arbain Road.⁸ Into the Bahr-el-Ghazal it was probably introduced by slave traders and Egyptian garrisons.

The surest method of ascertaining the presence, or absence, and incidence of bilharzia in any locality is the systematic examination of the urine of all boys at the Government schools, which exist all over the Sudan. Children are most liable to infection.

TREATMENT OF BILHARZIA BY ANTIMONY.

Since May, 1917, we have been treating cases of bilharziasis at the Khartoum Civil Hospital, both rectal and vesical, with intravenous injections of antimony tartrate.

The cases under review are seventy in number. They were under observation in hospital for from three days to a week before injections were commenced. They were not kept in bed⁹ nor were they dieted during the course of treatment. They lay down for an hour or two after the injections, or if they were sick or had colic or giddiness, or showed any symptoms attributable to antimony poisoning, they were kept in bed until next day when they had recovered; but to all intents and purposes the cases were living their ordinary life, up and about during the treatment, feeding on the "full diet" of the hospital. This course was adopted as it is well known that the active symptoms of bilharziasis can be temporarily relieved by rest in bed and milk diet.

In-patient treatment was adopted for forty of these cases in order to have the patients under observation whilst the drug was being tried.

⁷ This is, no doubt, still a source of infection, and is a real danger to the Sudan, an increasing danger as population increases and communications improve.

⁸ A desert journey of 850 miles taking forty days (Arbain = 40).

⁹ These intravenous injections of antimony tartrate for bilharzia have been given by several workers in out-patient practice (Malouf at Khartoum and Atiyeh at Singa). In the latter case the man, an Egyptian, was at work again throughout the course, half an hour after the injection. Time will show how far such licence is permissible. I mention this fact rather to show what has been done than to recommend it. When a good many injections have been given, and when the dose becomes large, caution must be exercised, the cumulative action of antimony tartrate must be taken into consideration as well as the size of the dose, and I think that, in the present state of our knowledge, a man had better rest at any rate for the remainder of the day when the dose reaches 2 gr. Later on, it will be related that we treated twenty-three of the sixty-four cases as out-patients, the boys coming up to the hospital for injections every other day, and one-hour after injection returning to the Gordon College to rest. (J.B.C.)

⁵ Anakliha is fifteen miles north of Singa, and about 10 miles from the river bank. The inhabitants get their water from wells situated in a dry watercourse. Arsha and Silk, S.W. of the river bank, respectively fifteen and twenty miles from the river, are also infected. All use river water.

⁶ It is commonest in Lower Egypt with perennial irrigation, not so common in Upper Egypt with basin irrigation, least common from Halfa to Khartoum with irrigation by water-wheels. South of Khartoum it becomes commoner again.

Although the conclusions are general and gathered from all the seventy cases, there are some particular cases which we have been able to keep under observation regularly for periods diminishing from a maximum of two years after they left the hospital and to call up for examination at intervals. There is no reason to think that the results in the other cases are not precisely the same, although we have not been able to keep such an extended watch on them.

The cases were rectal and vesical and both.¹⁰ All microscopic examinations were carried out with a Leitz No. 2 objective and a No. 4 ocular, with the mechanical stage of microscope removed.

METHODS OF EXAMINATION FOR BILHARZIA.

(a) Vesical.

The urines were collected in conical urine glasses and allowed to stand at least half an hour to settle. The sediment was then taken up by means of an ordinary glass pipette. Whilst the urine contained plenty of ova only one drop of deposit was placed on a microscope slide, but, as the treatment proceeded and the ova grew less in numbers, as much as 5 c.c. were taken and placed in a small oval shallow glass dish (38 by 65 by 25 mm. high). (Fig. 1.) By this means it was possible to observe nearly all the ova that had been passed in the specimen.

HATCHING OBSERVATIONS.

For hatching observations one-tenth c.c. of urine deposit was mixed with 6 c.c. of warm tap water (130° F.) in the small glass dish and the ova were watched under the microscope. (130° F. is the temperature of ordinary tap water in Khartoum—ova hatch¹¹ in four to five minutes in water at this temperature.)

Practitioners who are not prepared to make this simple experiment every day had better not use the treatment because it is, at present, the only logical method of ascertaining when sufficient antimony tartrate has been given. When the details of the complement fixation test are published* this may prove a very valuable method of ascertaining the presence, or absence, of worms. We do not think that the blood count for eosinophilia will prove of any value on account of the possible presence of other parasites which will vitiate the result.

¹⁰ The treatment applies with equal force to both rectal and vesical bilharziasis. The study of rectal bilharziasis is not quite so convenient as that of vesical bilharziasis and daily examinations of faeces need more tenacity of purpose on the part of the investigator.

In several cases there was a double infection of bladder and rectum. The rectal cases invariably contained lateral spined ova, sometimes both—possibly the faeces were contaminated with urine. In four cases we found lateral spined ova in urine (as well as terminal) and in one case lateral spined ova only.

¹¹ As is well known it is necessary when conducting hatching experiments to dilute the urine sufficiently to ensure the hatching of all fertile eggs. We found that a dilution of at least 1:60 was necessary.

* Note—Details have now been published. (1) *Journ. Roy. Army Med. Corps*, April, 1919, Major N. Hamilton Fairley; (2) *Lancet*, June 14, 1919.

(b) Rectal.

For the examination of faeces for bilharzia we give patients a saline purge and the stool is examined by the ordinary cover-glass method. If with negative result the whole stool is poured into a large glass jar and diluted with about three times its volume of water to which about 1 oz. of formalin (40 per cent.) is added.¹² This is allowed to stand for about half an hour, the supernatant fluid is then poured off. The process of washing is repeated until the fluid is clear, about four to six washings. Cover-glass preparations from the residue are made by means of a pipette. This method is most satisfactory when the ova are scanty. It is the method in general use at the Khartoum Civil Hospital for the examination of faeces for ova, cystic amebæ, worms, &c.

METHOD OF GIVING INJECTIONS (Fig. 2).

The injection is given in a room with a good light, the patient lying down. Intravenous injections, it need hardly be said, are among those things that should be done carefully, or should not be done at all. Whatever the properties of the drug, it is being injected into the most vital tissue of a fellow human being, and should, therefore, be done with a due sense of responsibility.

(a) Some Important Observations with regard to the Injection.

If any complications ensue the first question which should be answered is: "Was there anything at fault in the technique employed?"

The second (equally important) question is: "Was the patient injected without the doctor being fully aware that there were no contra-indications and no complications?"

Bilharzia is not a very fatal disease, therefore treatment is not urgent. There is plenty of time thoroughly to examine the patient before commencing treatment. Egyptian patients especially should be examined for intestinal parasites other than bilharzia.

The drug (antimony tartrate) is a poison and has a cumulative action, and so requires to be used with judgment and great caution, both as to dose and frequency of injections.

What we have said by way of warning may appear like supererogation or tiresome exaggeration. But there is a moral side to the medical work which in the great European medical schools is taken for granted. There a high standard of "sense of responsibility" is maintained, but let us say at once that practitioners to be met with overseas are not always working up to the high moral professional standards the spirit of which one expects to find instinctive in men trained at British medical schools.

¹² Formalin kills and fixes the bilharzia ova but does not alter their appearance.

Vesical cases have been studied as they are easier to observe and follow than rectal. In rectal cases the results, although more difficult to be sure about, were similar.

When one turns to practitioners of oriental races one finds a different moral code and one must bear in mind that it is necessary to inculcate in them what we mean by a "sense of responsibility" and sympathy with patients. These feelings are largely dependent on the imaginative endowment of the race and, on the whole, the European in this respect is better equipped than the oriental. "Put yourself in his place" is a sound medical axiom for both East and West and it underlies all the best medical teaching and is especially applicable in practice in our Dependencies.

It is possible that some medical officers do not "put themselves in his place" so automatically with "natives" as they would when dealing with a patient of their own race and colour.

Used with the caution and circumspection which one expects to be part of the equipment of a medical man, the intravenous injection of antimony tartrate may safely be employed for the eradication of bilharziasis in Egypt and the Sudan. But if this drug is employed by men who will use it empirically and in a commercial spirit, it is bound to fall into disrepute again as it did eighty years ago.

Whilst antimony tartrate is on trial it should be used by men who are in the habit of working scientifically, and by that we mean logically, and who will not conclude that the drug merits condemnation for every untoward incident, when it is much more likely that the doctor himself is to blame for faulty technique, or for not examining his case thoroughly before commencing treatment.

(b) Apparatus. (See fig. 3.)

The apparatus in use at the Khartoum Civil Hospital for the intravenous injection of antimony tartrate, both for bilharziasis and also for Leishmaniasis, is as follows:—

Two small 50 c.c. Bohemian flasks, one containing a sterilized solution of antimony tartrate— $\frac{1}{2}$ gr. to 20 minims distilled water—(20 gr. to the ounce), the other containing a sterilized solution of normal saline for dilution purposes, each labelled with their respective contents. Two record syringes (glass with metal plungers)—a small one of 20 minims, and a larger one of 10 c.c.—the same size needles are used for both syringes; they should be fine (hypodermic) and sharp with platinum-iridium tips (a fine sharp needle is a very important requisite). A small sterilizer, two or three small beakers, crucibles and watch glasses should be ready for holding and mixing solutions, and for containing the solution of antimony and normal saline ready for use.

A tourniquet (with a skillful assistant to compress the veins this may be dispensed with). A prominent vein of the arm is chosen, preferably not the median basilic at the elbow as it is in relation to the brachial artery: any prominent vein, however, will do—sometimes a vein at the back of the hand is conveniently conspicuous when others are not. This small operation should be done with much care.

It is absolutely necessary to inject the antimony

tartrate solution inside the lumen of the vein or phlebitis and necrosis result. Intravenous injections are not always easy to give, particularly in children.

The skin is sterilized with ether or alcohol—iodine may be used, but it has a tendency to obscure the veins on dark skins.

Treatment commences with the injection of $\frac{1}{2}$ gr. in about 40 or 50 minims of normal saline solution. Injections take place every other day,¹³ equal parts of the antimony solution and the normal saline being used when larger doses are reached. The dose is increased by $\frac{1}{2}$ gr. every injection until 2 or $2\frac{1}{2}$ gr. have been reached, and this is maintained (in the case of boys of sixteen or under, $1\frac{1}{2}$ gr. is the maximum dose employed). The total quantity of antimony injected would be 20 or 25 gr. according to circumstances.

If more than 25 gr. is required, the surplus needed should be reserved for a second course.

When the dose of antimony tartrate is $1\frac{1}{2}$ gr. or 2 gr. (sometimes before), a cough immediately on injecting indicates that the antimony is already in the pulmonary circulation, and shows that the drug is both rapid and far-reaching in its action.

The best time of day to give injections.

In conversation with one of the most intelligent of the patients, Case No. 30, he stated that he noticed when injected early in the morning—9.30 to 10 a.m.—the after effects were *nil*, whereas when the injections were given near lunch time—12.30 to 1 p.m.—he always had giddiness, vomiting and the reaction generally was severe. He had noticed this on the three last occasions, when the dosage was the same, &c. It would, therefore, appear that injections should be given some considerable time—three or four hours—before meal time.

CHANGES NOTICEABLE IN THE URINE DURING THE INJECTIONS.

During the course of intravenous injections of antimony tartrate for vesical bilharziasis, two notable changes take place in the specimens of urine.

(1) The first noticeable, visible change is the disappearance of blood, that is the visible (red) blood. Microscopical blood (smokiness) remains till later, but the urine becomes very markedly clearer. This appears to be an almost sudden and certainly a very noticeable change quite early, a few days after injections have been commenced.

This first change occurs as early as the fourth day after commencing injections, or when about 4 gr. have been injected.

(2) The next noticeable, equally marked and almost as sudden, change occurs in about fourteen

¹³ We have in a great many cases both of bilharziasis and leishmaniasis of skin (Tropical sore) given the injection for three consecutive days for the first three injections, and every other day subsequently.

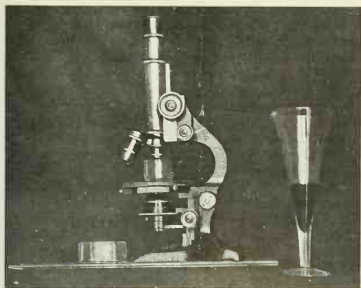


FIG. 1.

Microscope with No. 2 objective and No. 4 ocular. Conical urine glass. Small oval glass dish, containing diluted urine, standing on microscope stage.



FIG. 2.

Photo showing method of injection. Note native assistant removing tourniquet.

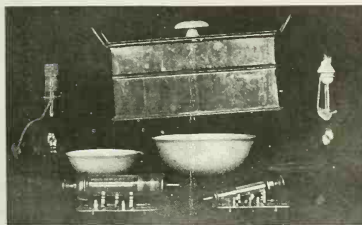


FIG. 3.

Apparatus.—Two small 50-c.c. glass flasks, containing: (a) sterile solution of antimony tartrate, 24 gr. to the ounce; (b) normal saline solution. Two record syringes: (a) 10 c.c., (b) 20 mm. Two porcelain dishes and one glass dish. Sterilizer.

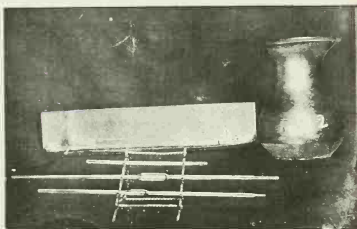


FIG. 4.

Method of finding *T. nana* in feces at Khartoum Civil Hospital.—Glass jar in which feces are shaken up with water. Large glass photographic dish in which small quantities of the diluted feces are examined through the transparent bottom of dish against black background. Pipettes, and needle on handle, the latter to pick up worms with.

days after about 20 gr. have been injected. The urine apparently becomes quite clear and normal.¹⁴

It is mere speculation to say so, but it may be that the first pronounced change corresponds with the closing activities of the parent worm—that is to say about the time the schistosome worms die, or retire from the small vesical veins—the breeding-ground. This change is not always on the fourth day: it was in some cases on the seventh, and it probably varies according to circumstances, to the heaviness of the worm infection amongst other things (some *hilharzia* cases have three or four hundred of these parent worms in the portal circulation), but it was always after a few days of injections. The improvement in the appearance of the urine was so marked at this early date that it would appear to indicate the occurrence of an important event. If it is a correct assumption that the parent worms are killed after three or four doses of antimony, then we must admit that the *Schistosomum hematobium* is very sensitive to the action of antimony tartrate.

The second change begins to take place even before 20 gr. have been given, and 20 gr. possibly mark the completion of the change. It commences after about 12 or 14 gr., or even less (10) have been injected and seems to correspond with the time when the ova are affected by the circulating antimony tartrate; when the urine becomes quite clear¹⁵ and when microscopically examined the ova are found to be sterile, and none hatch out, then probably sufficient antimony has been injected, and we think the patient is cured.

We should, from our present observations, say that this occurs approximately at 20 gr., but that, as a precautionary measure, we think that injections should go on to 25 gr. for the ordinary case.

One or two examples.

One of the early cases, Fadl Ali, had in all 36 gr. in thirty-one days. We were intending to go on injecting antimony tartrate until the ova dis-

appeared altogether, for we thought at that time that the presence of ova in the urine signified that the case was uncured, but this is not so. We think now that 36 gr. is too large a quantity of antimony to give in one course.¹⁶ He, Fadl Ali, was thin and anæmic towards the end of the course of 36 gr., and was suffering mildly from chronic antimony poisoning, and accordingly injections were suspended. This case is of interest in view of what is advanced by some critics of this treatment—that it causes necrosis and fatty degeneration, a statement which requires investigation. This boy was twenty years of age. He had 36 gr. antimony tartrate; he showed, we thought, some symptoms of chronic antimony poisoning but he got quite well and remained so.

On December 12, four months after the last injection had been given (August 15), he was in good condition, having put on weight since he left the hospital; his mucous membranes were of a good healthy pink colour. Urination had continued normal since his discharge. Urine (12/12/18). Colour, normal, clear. Specific gravity, 1020. Reaction, acid. Albumen, nil. Sugar, nil. Deposit not visible. Microscopic, no blood, two shrivelled black ova which did not hatch.

Another case, Ahdel Galil Mahmud, had 31 gr. in all over a period of twenty-seven days. His was a heavy infection, and he had previously passed blood in his urine for over four years continuously. After five days' injections (6½ gr. in all) the first marked improvement was noticed in the urine. After 12 gr. had been injected, in seven days, the urine was quite clear, the second marked improvement. The urine had never been free from blood, and therefore had not been clear for the past four years, so that the effect of the injections was very marked. There was then a period (after about 16 gr. had been injected in ten days) when ova became very scanty or non-existent. In twenty-seven days, after 31 gr. had been injected, the ova became more numerous again, as many as forty being counted in the dish (October 3, 1918), but they did not develop or hatch. They have continued since in diminishing numbers, but have never shown signs of hatching. The urine has remained normal except for the ova, and they are simply harmless, oxidized, sterilized ova, capable of no more mischief than a petrified hen's egg.

On May 5, 1919, eight months after injections ceased, the urine is absolutely clear and normal-looking. Specific gravity, 1017; reaction acid, free from albumin, blood or other abnormal constituent, excepting one or two shrivelled ova. Here we have ova escaping—eliminated—into the bladder eight months after the last injection. The boy would, so far as physical examination went, including the examination of the urine, pass any life insurance test. The attention of critics may be directed to this case. 31 gr. antimony tartrate injected,

¹⁴ This observation is by a clinician using clinical terms. The terms "clear" urine and "normal" urine are used as practical and not exact terms, and require definition. By "clear" urine is meant natural-looking urine—urine which to all appearances is normal; quite clear, yellow, healthy looking, with perhaps a zephyr-like cloud of mucus suspended in it. By "normal" urine is meant not only clear looking urine but urine which reacts normally to the ordinary chemical tests as usually applied for life assurance examination (e.g., no albumen that can be discovered by heat or cold HNO₃, no deposit, and nothing in its appearance to make one suspect blood, acid in reaction of course, and of ordinary specific gravity). The urine may not, strictly speaking, be normal; it probably contains ova which, although not normal constituents are, however, sterile and harmless, and need the microscope to detect them. So "normal" may be said to mean when applied to urine—urine containing nothing that can be said to indicate mischief or harmful clinical processes. (J.B.C.)

¹⁵ All cases do not become absolutely clear and normal. The above is true in cases free from complications. When the bladder is papillomatous or ulcerated, or fistulous, or has calculi, then the picture is modified according to the circumstances present. We do not say that antimony tartrate cures fistule, stone, papillomata, pyo-nephrosis, &c. We say that antimony tartrate acts on the bilharzia worms, kills them, and that it sterilizes the ova, no more.

¹⁶ Low, *Brit. Med. Journ.*, April 5, 1919, injected 47 gr. for leishmaniasis of skin.

patient aged 22 years, and patient alive and healthy at this present time—eight months after. He is one of the hospital attendants, and is, of course, under observation every day, and has been quite well and normal since the injections.

Yusef Wasif¹⁷ showed the marked early improvement in the urine one expects about the third day, after 3 gr. had been injected, and no visible blood occurred in the urine after the fourth injection in five days (6 gr. in all). On about the fourteenth day of the course (nine injections and 16½ gr. injected altogether) the second marked change was noted. The urine settled quite clear—no smokiness—there were some blood cells to be found under the microscope, and a good deal of mucus it is true, but the mucus resembled more the normal flocculent, zephyry, barometry mucus of healthy urine than that of cystitis, and also about this time a change took place in the ova. A good many were black and granular, some were normal-looking and hatched normally, but more slowly than usual, and the hatched miracidia swam about in a quite healthy fashion. As time went on these ova of normal behaviour became fewer, and at last disappeared altogether; the ova which continued to be discharged were sterile and harmless.

NOTE.—Ova may be absent from the urine for a period of time during the course of treatment, and may reappear in groups or showers, and continue for some time, but always after a time the ova which do occur are dead, shrunken, black-looking with amorphous contents, and they are sterile, and, of course, will not hatch and are harmless. They occur in clusters or groups, as by degrees they ulcerate through the mucous membrane of the bladder. These ova are not the new-laid eggs of live parent worms; they have been deposited by worms before they died, and they will continue to appear in the urine so long as there is any of the batch, or hatch, or brood left in the mucous membranes of the bladder or rectum to ulcerate through. They may continue for over a year after the course of injections has been completed.

How long ova remain in the tissue alive under normal conditions capable of developing on the addition of water is not known; probably for weeks or months. Their shell is permeable and they can obtain nourishment from the tissue fluids, or they may remain quiescent. When antimony is given the ova deposited in the tissues live for a certain time, and then either die a natural death or are killed by the concentration of the antimony tartrate in the tissue fluids about them. Those killed by the antimony are the oxidized-looking ones—black, shrunken, granular.

Occasionally, but not often, a few of the ova in an ordinary untreated case have this appearance.

DIRECT EXPERIMENTS CONFIRMING PREVIOUS STATEMENTS.

We have made experiments by the addition of a solution of antimony tartrate to diluted urine containing ova and examined under the microscope—a weak solution delays and a stronger solution prevents hatching; the embryos, if they hatch, seem to tumble out of the shells and die on the spot. 2 gr. of antimony tartrate in 6 c.c. of water, added to one drop of urine containing ova, actually prevents a large number of the ova from hatching by killing the embryo *inside* the shell. The solution, therefore, *penetrates the shell* and kills the embryo inside, but it may be reasonably doubted whether the dilution of antimony in the blood is strong enough to kill the ova enclosed in the shell. However, experience seems to point to its actually doing so.

If this is a fact it may be explained by a more dilute solution acting over a longer period. This is what we might expect in the circulation,¹⁸ or the ova may be killed when the antimony tartrate has reached a certain strength by accumulation.

We thought that the ova of patients during injections were more sensitive to a solution of antimony than those not so treated—that is, although they hatched they took longer to do so, and fewer of them hatched, and when hatched they appear to die at once. This point requires further careful working out. It is an interesting point to investigate, as it bears on the cumulative action of antimony tartrate. We should say from our observations that the parent worm was the most sensitive to antimony, the embryo in the ovum next, and the most resisting of all the free embryo (miracidium) swimming about in the dilute urine, and this, we think, is what might be expected. The parent worms in the tributaries of the portal system do not need much protecting paraphernalia, the ovum in the bladder or rectum, and subsequently in the urine or faeces, requires a little more; the embryo hatched in a puddle or swimming about in the river requires to be able to resist all manner of hostile external elements in order to protect itself against the constant adverse conditions which it encounters everywhere whilst searching for its intermediate host, the mollusc (*bullinus* or *planorbis*),¹⁹ in order that it may fulfil its destiny.

LENGTH OF TIME OVA CONTINUE TO BE FOUND IN THE URINE AFTER DEATH OF PARENT WORM.

It would be an interesting point to know how long it takes for a single brood of ova to come through into the bladder cavity completely. It

¹⁷ Yusef Wasif. This is a case where, although the worms were apparently killed and the ova sterilized, the urine did not become quite clear and normal—he probably had chronic cystitis due to a papillomatous or unhealthy condition of the bladder wall. He was re-admitted and his bladder washed out and the urine became quite clear and normal.

¹⁸ Or it might be that the ova are killed by the antimony tartrate in the urine.

¹⁹ *Bullinus dybowskii*, *B. innesi*, *B. contortus*, *Planorbis boissyi*.

may take many months—over a year²⁰—and probably varies according to circumstances, as ova apparently have no power of movement themselves, the parent worm having died long ago from the injection of antimony in its early stages. The ova already deposited pass to the surface of the bladder and rectum, and are eliminated in time as ordinary foreign bodies.

Another point, interesting because it bears on the question of period of infectivity, does a dead ovum take longer than a living one to pass through the coat of the bladder? We think they both act simply as inert foreign bodies with a spike, and probably take the same time.

MEANS OF ASCERTAINING WHEN THE PARENT WORMS ARE DEAD.

Another question: Can one by examining urine microscopically and the ova in the urine tell when the worms are dead, and so when to stop the antimony tartrate, if one wished to stop when the schistosomum worms were dead?²¹ We should say: No, we cannot at present be certain. But, as it is even more important to render the ova which are being eliminated sterile, and so obviate this very fertile source of infection (prophylaxis), and as, apparently, the ova are capable of more resistance than the parent worms, we think that when all the ova being passed are sterile sufficient antimony has been given to make sure that the worms are dead. This occurs, we think, after 20 gr. altogether have been given, and we should continue up to 25 gr. in order to make the result more certain.

In an ordinary uncomplicated case after a course of, say, 25 gr. a man feels quite well, he looks quite well, and has a colour when before he was pale. He has no urinary symptoms whatever, and on examination his urine contains ova which do not hatch, otherwise the urine is quite normal, containing neither blood nor albumen. Can it be said that he is cured of his bilharzia? We think that it can.

²⁰ We have cases under observation who are still eliminating urine a more than a year after their last injection.

²¹ Two methods suggest themselves—(1) by means of the eosinophilia, but this is not likely to yield good results. In the first place the estimation given by the various authors is too high—23 per cent. by some. This high index has been obtained possibly from the fact that the cases investigated were not cases infected with bilharzia alone, but had other parasites which helped to increase the eosinophilia and vitiate the estimate. The cases were Egyptians who besides having bilharzia, were probably full of other parasites. Unless all other parasites present had been eliminated, their presence would interfere with the conclusions on the amount of eosinophilia attributable to the presence of bilharzia. (2) Another method, the recently introduced complement fixation test (Fairley), appears to promise much in this direction. Now if this test is confirmed, we presume that the test depends in its application on the presence, or absence, of live worms in the portal circulation. After the death of the worm we assume that the test is negative. We have not ourselves had experience of the test, but when Major P. Bahr kindly described it to me, March, 1919, it struck me that it might be very usefully applied after treatment with antimony tartrate.

In a case where the bladder wall has become altered by bilharzial infection the urine will continue cloudy with a considerable deposit of mucus, the urine of chronic cystitis. Such a case will require to have the bladder washed out and to be treated for his cystitis, but eventually the urine will become quite normal. Such a case was Yusef Wasif.

WHEN DOES THE ANTIMONY BEGIN TO AFFECT THE CONTENTS OF THE OVUM DEPOSITED IN THE BLADDER?²²

Apparently this varies according to circumstances. In one of our cases—a case of mild infection—Mahmud el Tom—quite half the ova appeared black and sterile after four days' injections.²³

In another, Yusef Wasif, it was not until after the course had been in progress for fourteen days and 14½ gr. had been given that it was noticed that quite half of the ova were black and sterile, whilst the others hatched; the embryos hatched, however, seemed very feeble. This case was one of a rather heavy infection, so probably the amount of antimony necessary for a "cure" varies according to circumstances.

NOTE.—It would appear as if the presence of visible red blood in the urine meant activity on the part of parent worms.

One of our cases, Mahmud Eff. Sami, seemed to confirm this. A severe hæmaturia brought him into hospital, and in the urine deposited in the conical jar were found two adult bilharzia worms coiled.

NOTE.—With regard to the more serious cases of bilharziasis—those complicated by fistula, cystitis, stone, renal and other complications—we think that while the treatment of antimony is in its early stages of trial, these cases may be left for later investigations. They are complications and are incidents in bilharziasis. We have no doubt that antimony tartrate will also in these cases kill the worms and sterilize the ova. It will not cure the fistula or cystitis due to permanent change in the bladder wall, nor the stone, nor the renal complications. In such cases antimony tartrate will have to be used with considerable care and judgment. Antimony tartrate is admittedly a drug which should be used with caution, especially in cases where vital organs are not sound, and in cases where the patients are debilitated. The majority of cases one comes across in the Sudan are uncomplicated.

CRITICISMS.

The antimony tartrate treatment for bilharziasis has not escaped the attention of the critics. It will, we think, weather the storm of all unfavour-

²² Is it the ova in the urine or those in the bladder wall which are affected?

²³ In some instances, though not often, the ova in a case which is not having any treatment may appear oxydized, shrivelled, dead.

able criticisms, and will establish itself all the more firmly for the wholesome publicity it has acquired.

Objections have been raised to the use of antimony tartrate for bilharziasis on three grounds:—

(a) That it is a dangerous drug.

(b) That it causes tachycardia and other cardiac symptoms.

(c) That it causes fatty degeneration.

The same three objections might be raised to the treatment of kala-azar and leishmaniasis by antimony tartrate, and yet we have used this drug over and over again in the cases of Englishmen and other Europeans for the cure of tropical sore with no harmful result whatever, and we think it may safely be used in cases where the organs are healthy and where there are no complications.

It is a drug which calls for caution and judgment in those administering it, but the fact that it is injected directly into the most vital tissue of the body, namely the blood, presupposes this, and we should not insist on so obvious a fact if it were not the case that in Africa there are some practitioners to whom this warning is very necessary. Of course, the man who works in the spirit of the traditions which he has inherited from the great English medical schools requires no such warning. Such a man will inject antimony tartrate into his patients' veins with as much care as he would wish to be exercised if the operation were done on himself and, if he does this, then no harm will ensue. A man who injects any drug intravenously with no more concern than he would experience if he was injecting a pin-cushion is bound to have incidents and accidents.

TACHYCARDIA AND CARDIAC PAIN AND INTESTINAL PARASITES IN EGYPT AND THE SUDAN.

The intravenous injection of antimony tartrate has been accused of giving rise to cardiac symptoms, particularly tachycardia and cardiac pains, and the suggestion is that it is therefore a dangerous remedy to use for bilharzia.

In Egypt tachycardia is quite a common thing. Recruiting Officers for the Egyptian Army will admit that it is one of the most common reasons for rejection, and it is a common cause of invaliding out of the Egyptian Army. It is usually due to intestinal and other parasites which infest the bowel of Egyptian fellaheen, particularly ankylostoma, bilharzia and *Tenia nana*. We have frequently had in the Khartoum Civil Hospital Egyptian soldiers harbouring at least six different kinds of intestinal parasites, including ankylostoma, bilharzia, *T. nana* (*Hymenolepis nana*), anæbæ, flagellates, ascariis, &c., and it is very easy to understand why a man who harbours these parasites has a fatty or unsound heart and probably some fatty degeneration of other organs—liver, kidneys, blood-vessels—and that his military exertions will cause hypertrophy of the left ventricle and perhaps dilatation and so tachycardia and cardiac pain.

Before antimony tartrate is blamed for tachycardia, cardiac symptoms or untoward incidents, other causes must be excluded, and before the antimony tartrate is administered these parasites or causes if present should have been eliminated by treatment.

We have now treated more than seventy cases of bilharzia of all ages by this method, from the age of 9 onwards, and we have had uniformly successful results. We have had no contretemps or untoward incidents and not only we of the Khartoum Civil Hospital believe that antimony tartrate is specific in its action on bilharzia, but the patients after treatment invariably consider themselves cured and are quite satisfied. As many of these patients have passed blood every time they micturated for four or five years they are, of course, profoundly impressed when they see the urine become clear and remain so.

Speaking generally, half the ailments a doctor meets with in Egypt and the Sudan owe their origin to intestinal cachexy. The Egyptian²⁴ is full of intestinal parasites and there is circumstantial evidence in support of this in the fact that there is nothing one can give him that he understands or likes so well as a drastic purge. It unloads him of his parasites and it rids him of an accumulation of intestinal sepsis which he knows, by instinct, to be the cause of his trouble.

Patients' faces are not examined microscopically as often as they should be either in Egypt or elsewhere. This is a great misfortune in a tropical country, for it leads to disastrous speculation as to the nature of complaints, and it tends to the complication of medicine by observers who are constantly discovering mysterious new fevers and new local disorders, in reality often due to the toxins of intestinal parasites. This perhaps is not strictly relevant here, but let us say that the examination of the faces for other parasites is important in the treatment of bilharzia of bladder or rectum by antimony tartrate in Egypt, in order to discover whether there is also bilharzia of the rectum, even if the patient has been admitted only for hæmaturia. Ankylostomiasis, tapeworms, especially *T. nana* (*Hymenolepis nana*), ascariis, and other worms, *Amaba dysenteriae*, *Heterophyes heterophyes*, flagellates, &c. If he has got any—he may have all—of these they are best got rid of before treatment by antimony tartrate, otherwise he will, most probably, have tachycardia, irregular heart, pain, &c., if he did not have them before the injections.

We have seldom found an Egyptian bilharzia patient with solely a bilharzial infection. He usually has other parasitic infections, and in some cases six or seven different kinds are readily demonstrable in the faeces under the microscope.

Now we find at the Khartoum Civil Hospital that the commonest complicating infection in

²⁴ The inhabitants of the Sudan are much freer from intestinal parasites than the Egyptians.

Egyptian bilharzial patients is *T. nana* (*H. nana*).²³ It is much more commonly present in Egypt than is generally supposed, and it escapes observation because it is small and difficult to find. The easiest way to discover its (*nana*) presence is by microscopically examining the faeces, discovering the ova, which are characteristic, small, globular and colourless, with a thick outer envelope; this is separated by a narrow space of fluid from the yolk sac which contains the embryo with hooklets. The worm itself is a tapeworm, one of the smallest. It does not look like a tapeworm until examined under the microscope, but to the naked eye it resembles a small piece of thin thread. It is 10 to 45 mm. in length and 0.5 to 0.7 mm. broad, and has twenty-four to thirty hooks in a single circling of the rostellum.²⁶ It is therefore considerably smaller than a thread worm, a bilharzia, or an ankylostome.

As an example to illustrate how *T. nana* may, and often does, give rise to anaemia, tachycardia and cardiac symptoms, we may quote a case:—

Ahmed Abdel Latif, 12 years (servant of Mr. Coulson), was sent to the Khartoum Civil Hospital April 10, 1919, with the following story: He had pain in his heart when he was working, an attack every five days. He had complained of this pain for twenty days, and had, therefore, had four attacks. He was an Egyptian, and had been for two years in Khartoum. He was born at Malter (north of Cairo). He was pale and thin and delicate-looking, he worked well, acting as nurse for the baby. On examination he had tachycardia (150-130), thumping heart, though the apex beat was not displaced, and the cardiac sounds were natural. In other respects he was normal. Ova of *T. nana* were found in the faeces, and he passed several hundred *T. nana* after a dose of F. mas. All these symptoms disappeared after a course of simple iron mixture following the loss of several hundred *T. nana* worms after the appropriate vermicide.

In the light of our experience at the Khartoum Civil Hospital we are inclined to think that cardiac symptoms in an Egyptian are very often due to the presence of *T. nana*.²⁷

T. nana when looked for is exceedingly common amongst Egyptians. Most of our Egyptian bilharzia cases, besides having bilharzia, had *T. nana* too, and *T. nana* is easily overlooked except by expert workers. The ova are peculiar and are the best means of diagnosing the presence of the tape-worm. The worms themselves require careful searching for. The faeces have to be examined in small quantities at a time. The worms being light do not sink on addition of water, so they cannot be separated from the faeces by washing as other worms can.

We have (see fig. 4) at the Khartoum Civil Hospital a method of finding *T. nana* after F. mas has been given which has proved very successful. The faeces are placed in a jar (fig. 542, Baird and Tatlock's list, 1914), diluted with water and shaken up. A small quantity of the faeces is then poured into a large glass photographic developing dish: the fluid is transparent, and if the glass dish is held over a dark background, the small, whitish, threadlike worms may be picked out one by one with a fine needle on a handle.

In conclusion, we may briefly state that in Egypt, if other intestinal parasites such as ankylostomum and *T. nana* are not looked for in the faeces, and, if found, are not eliminated before the course of intravenous injections of antimony tartrate is begun, then tachycardia and cardiac pain will possibly follow, and likewise the patient will continue to be anæmic and weak, but that antimony tartrate should not be blamed for this.

We have observed the above over and over again at the Khartoum Civil Hospital, and so we invariably now examine the faeces of our hospital cases of bilharzia as a routine method before commencing treatment.

FATTY DEGENERATION.

It has yet to be proved that antimony tartrate is the cause of fatty degeneration, such as was said to have been found in an Egyptian who died of influenzal pneumonia and who had had injections. There were so many other causes in this case to which it might well be due, that one is inclined to be sceptical. Fatty degeneration does not, we think, follow the administration of antimony tartrate if given in the dose necessary for the cure of bilharziasis or leishmaniasis.²⁸

Amongst the seventy cases treated we have seen nothing to make us suspect that antimony tartrate causes fatty degeneration. In any case, with a maximum dose of 25 gr. total per course, we think a patient is safe,²⁹ but rather than risk fatty degeneration until we have had more experience about the action of the drug given continuously over a period of time, we advise that a second course be given after an interval of three or four months if more than 25 gr. are necessary. It is true that it is highly desirable to find out what is the minimum dose necessary to accomplish the object in view—to kill the worms and sterilize all the ova deposited—and it is in anticipation of the new complement fixation test being able to assist in this first object that we should like to see details

²³ One writer suggests that the sudden death of this Egyptian who had influenza and pneumonia and a dilated heart was due to "fat embolism" because a certain amount of fatty degeneration was found in sections of the liver, kidneys and vessels. Such a statement can only come from one who has his eyes glued to the microscope and whose conclusions are independent of clinical facts.

²⁹ Low, *Brit. Med. Journ.*, April, 1919, reports a case of leishmaniasis of skin where he injected 47 gr. without harmful result.

²⁵ Its intermediate host is the rat, mouse and field-mouse.

²⁶ Braun's "Animal Parasites of Man."

²⁷ It is uncommon amongst the Sudanese, though we have found it in patients coming from all parts of the Sudan, even the Bahr el Ghazal.

of the test published; we understand that it has been in the press for some months (it has since been published).

We believe that the microscope will remain our guide in the process of sterilization of the ova.

COMPLICATED CASES OF BILHARZIA.

It is inconceivable that parasites of the size of bilharzia and of the number (sometimes over 400) living in the portal vein tributaries of a human being for many years, very often over ten, should not produce other clinical evidence of their presence beyond that which may be attributed to the mere mechanical action of the small foreign bodies (ova). The parent worms draw whatever nourishment they require directly from the blood-stream, and they discharge into the blood-stream waste products. Effects of this are anaemia, dirty skin, chronic enlargements of organs, such as liver and spleen, and, maybe, changes in other organs and tissues, such as fatty degeneration, not always demonstrable clinically.²⁰

Other evidence appears in the eosinophilia (some authorities say 23 per cent.) which accompanies bilharziosis. Of this eosinophilia we shall have more to say; we do not accept the figures generally given (see table at end of paper).

In this connection I remember Major P. Bahr (March, 1919), when explaining to me (J. B. C.) the complement fixation reaction—the details of which have been slumbering in the publisher's pockets for many months, and so have not yet secured the publicity they so evidently deserve.³¹—laid emphasis on the reaction as evidence that the results of bilharzia were not only mechanical and local, but were general and far-reaching, and I quite agree that the symptoms of bilharzia are not merely those which may be attributed to the mechanical action of the ova, although most of the text-book symptoms and complications which we commonly associate with bilharziosis are due to the mechanical action of the ova deposited in the tissues, bladder and rectum, ureters, kidneys, liver, &c., the grosser and graver surgical complications such as the papillomatous condition of the bladder and rectum, cystitis, fistula, stone, hydro- and pyonephrosis, are not especially bilharzia, but are due to the chronic mechanical irritation of foreign bodies—the ova with their spikes.

We have had no experience of the treatment of these aggravated cases by antimony tartrate, but we think that in treating them more caution should be exercised in the dosage used and frequency of dose. Such patients are likely to be debilitated, weak, and to have unsound organs. Still, we believe that in these cases also the bilharzia parent worms and the deposited ova may be killed by the

use of antimony tartrate, and the patient placed in a better position for the curing of the cystitis, fistula, stone and renal complications by ordinary surgical and medical measures.

The enlargement of liver and spleen which one so often meets associated with bilharziosis is certainly amenable to treatment by antimony tartrate. Such enlargements disappear in a short time when treated by antimony tartrate, and the organs resume their normal condition, more especially if opportunity be taken to get rid of other intestinal parasites as well, and render the bowels less septic. Such a case was Abdel Rahman El Hagg, aged 13 years. He was admitted to hospital on January 19, 1919, with enlarged liver and spleen. January 27, 1919, liver enlarged to $4\frac{1}{2}$ in. below the metasternum, spleen $2\frac{1}{2}$ in. below the ribs. The faeces contained large numbers of ova of bilharzia, lateral-spined, and *T. nana*, motile amoebae and flagellates. He was given a course of antimony tartrate commencing January 28, 1919, and completed March 20, 1919, total $16\frac{1}{2}$ gr.

Reported for inspection May 7, 1919, liver and spleen barely felt.

THE BEHAVIOUR OF THE OVA AND MIRACIDIA TOWARDS ANTIMONY TARTRATE.

If $\frac{1}{10}$ c.c. of urine laden with bilharzia ova be taken and mixed with 6 c.c. of tap water at 130° F., and examined in an oval glass dish under the microscope with a No. 2 Leitz obj. and No. 4 ocular, it will be found that the ova will commence hatching in four or five minutes, and that most will have hatched out in an hour.

If the same experiment be done with the addition of 1 gr. antimony tartrate to the water only about half the ova will hatch out, and a good many will either be found dead half in and half out of the shell, or will appear to have survived the hatching process only a short time, as they will be seen dead by the side of the evacuated shell-like corpse and coffin.

Even the more resisting miracidia which are swimming about will not live for nearly so long as embryos which have been hatched in plain water.

If the same quantities are used with 2 gr. antimony tartrate, very few embryos hatch out, and those few found swimming about do not survive very long.

This seems to show that the antimony tartrate in solution penetrates the shell and tends to kill the embryo inside the shell.

Now if to solution No. 1, where most of the ova have hatched out, and where the miracidia are swimming about in large numbers, $\frac{1}{2}$ gr. antimony tartrate be added, the movements of the miracidia are markedly changed. Normally they are darting about with a pulsating movement, the sharp non-ciliated end forwards, revolving all the time on their own axis. This cork-screw action no doubt is to enable them under natural conditions to penetrate into the intermediate host when they come across him. On the addition of the antimony

²⁰ "Some Notes on Bilharzia," Major A. R. Ferguson, *Journ. R.A.M.C.*, vol. xxix, July-Dec., 1917, p. 57. This experienced observer draws attention to the dissemination of the ova about the body, lungs, spinal cord and ovaries, giving rise to symptoms not commonly associated with bilharzia-spinal cord lesions, such as disseminated sclerosis and locomotor ataxia, sterility, &c.

³¹ July, 1919. They have now been published.—J. B. C.

tartrate the miracidia slow down, they squirm, they wriggle and they writhe, they have convulsions, and, assuming a thicker and shorter form, they die. They do not all die, however; some appear to escape, but the period of activity is considerably diminished by the antimony tartrate in every case.

In making these observation experiments with bilharzia, what is striking is the variation in resisting power of the different individual ova or embryos or miracidia. Some ova hatch very much sooner than others under normal conditions, and some miracidia appear to be more active than others, and some appear to have a longer life, this quite apart from any accidental external circumstances, such as becoming entangled in a wisp of mucus.

Judging from direct experiments with antimony tartrate and from clinical results, one arrives at the conclusion that antimony tartrate has a profound and specific effect on bilharzia at all stages. It kills the parent worm *in situ* in the portal tributaries.³² It penetrates the ova as they lie deposited in the tissue wall and kills the enclosed embryo. It also has the power of killing the miracidia.³³

We should say that, speaking under correction (as we have not been able to apply the test directly to living worms):—

(1) The parent worms are the most readily affected.

(2) The ova next.

(3) The miracidia are most resisting of the three to antimony tartrate. The specific action of antimony tartrate on bilharzia is confirmed by direct experiments on the ova and miracidia.

THE PERMEABILITY OF BILHARZIA EGG SHELLS.

With regard to the above, Leiper states that the shells are chitinous and impermeable, and that it is impossible to destroy them by treatment owing to the chitinous nature of the egg shells. This is not quite true. The shell of the *bilharzia* ova is permeable:—

(1) To water—it will not hatch unless water is added to urine or faeces.

(2) To formalin—which kills and fixes the contents.

(3) To antimony tartrate—which sterilizes the contents.

The shells of some ova are not permeable; for instance, the shell of the ankylostome is not permeable to water or to formalin.

If to an ordinary stool obtained for examination

purpose is added about 1 oz. of 40 per cent. formalin the bilharzia ova are sterilized, the ankylostoma ova hatch out. The contents of the shell protected by it are unaffected by the formalin.

WHAT IS THE OPTIMUM DOSE OF ANTIMONY TARTRATE?

We do not think that we have settled this important question. It is advisable until more is known of the action of a prolonged course of antimony tartrate on the tissues of the body to give as little as possible. It is a powerful drug, and it is searching and far-reaching in its effects, and it has a cumulative and probably a prolonged action, although, according to the results of quantitative analysis in two cases, a great deal (one-third) is excreted at once by the kidneys during the period of injections.

The early cases in our series were given probably more than was necessary (35 gr. or more), but, as we gained experience, we found that so large a quantity was not only not necessary, but was harmful. We did not have a fatality or anything approaching it. We now think that about 25 gr. is sufficient to do whatever is required, and that the optimum dose is between 25 and 30 gr. Time will show.

If more than 25 gr. are required, we think that it is better to inject the drug in two courses with some months interval between the courses.

EFFECT OF ANTIMONY TARTRATE ON OTHER PARASITES.

Antimony tartrate does not appear to have any effect on parasites, such as malaria,³⁴ in the peripheral blood; nor on amebae, flagellates, *H. nana*, ankylostoma, oxyuris, ascariis, &c., in the intestines.³⁵ These parasites remain in their respective situations without suffering any apparent effect from the antimony tartrate injections, and are only dislodged by their own especial drugs. As a general rule we have dealt with them, if they were present, before giving the course of antimony tartrate, and we consider this a good plan, because it obviates complications and renders the administration of the antimony tartrate free from risk.

CHEMICAL ANALYSES OF THE ANTIMONY TARTRATE EXCRETED IN THE URINE.

In two cases Mr. Freak, Chemist of the Wellcome Laboratories, Gordon College, made a series of quantitative analyses. The total amount of urine was collected daily, and an analysis made of the total amount of antimony tartrate eliminated in

³² In the only case of a post mortem made on a man who died of influenza and pneumonia a short time after injections had been completed (33 gr.), and the man apparently cured (clinically) of his bilharzia, no parent worms were found in the portal vein. JOURN. TROP. MED. AND HYG., Archibald and Innes.

³³ In this connection it may be stated that occasionally miracidia are hatched in the bladder and sometimes in the urine glass, but the urine, as is well known, usually requires to be well diluted to enable the hatching process to proceed.

Another fact we have observed, occasionally parent worms are passed in urine (Sami Eff. Khalil). In this case a coupled pair.

³⁴ With the possible exception of "crescents."

³⁵ (1) We have not had the opportunity to try it on trypanosomiasis or filariasis, both of which being in the blood-stream it might be expected to influence. It is the routine treatment for cases of leishmaniasis in all its three forms at this hospital.

(2) It seems to be an interesting fact that whilst the shell of the bilharzia ovum is pervious to water and chemicals (e.g., formalin and antimony tartrate), the shell of the ankylostoma ova is non-pervious to water, formalin or antimony tartrate, and hatching of the ankylostoma proceeds whether in water or formalin or antimony tartrate solution.

each twenty-four hours. The results are tabulated and shown in addenda.

More work needs to be done in this connection before general statements can be made, but, so far as it goes, it shows that a very considerable quantity of antimony tartrate is eliminated at once by the urine, a third of the total amount given during the time the examinations were made. One would rather conclude from this that the cumulative action of antimony tartrate may have been over-estimated by the old writers.

PROPHYLACTIC ACTION OF ANTIMONY TARTRATE.

That antimony tartrate acts and destroys the embryo bilharzia in its shell is an interesting and important fact in itself—more important than the question of killing the parent worm. If it is true it means that antimony tartrate, in addition to killing the bilharzia parent worm in the portal circulation sterilizes ova (perhaps some thousands) which are already deposited in the tissues, and which would—even though the parent worms were dead—be a source of wholesale danger to the community because they are capable in the presence of the intermediate host of transmitting the disease to others when eliminated in urine and faeces. We think that the greatest value of this treatment will be found in this prophylactic action, for it is clear that if the treatment is adopted on a large scale and ova which are evacuated are sterile, there is an excellent chance of stamping out this disease in the Sudan and Egypt by cutting off the source of infection, and so breaking the chain in the cycle of development at a very important point.

CAN THE TREATMENT BE APPLIED ON A PRACTICAL BASIS?

Most of these seventy cases have been treated as in-patients in hospital, though not in bed. This has been done because we wished to have patients under complete control in a series of first cases. We did not know much about the properties of antimony tartrate except that it had a very bad character, and that it was as a drug very seldom used. We had previously used it in a good many cases of leishmaniasis with success however.

Now we do not think that it is necessary to have bilharzia patients in hospital at all for treatment with antimony tartrate in uncomplicated cases. We treat all our tropical sores by the intravenous injection of antimony tartrate as out-patients; and why not bilharzias—at least, those otherwise healthy?

We have already quoted two cases of bilharzia treated by their respective doctors in the out-patients clinics, and we have ourselves treated simultaneously twenty-three boys from the Gordon College schools, bringing them to the hospital every other day for injections and examination of urine, sending them to and from in a conveyance, as the distance between the hospital and the school is considerable. No harm resulted.

It is necessary, however, we think, to examine the cases thoroughly before commencing treatment, and especially to examine the urine, not only for bilharzia, but for albumen. A large quantity of albumin indicating renal inadequacy would contraindicate injections according to our present experience, as the kidneys are largely responsible for the elimination of the antimony tartrate, and they should be in good working order.

We think that a well-organized out-patients department, with facilities for the proper administration of the antimony tartrate and with adequate equipment for microscopic examination of urine is sufficient, especially if there are some arrangements for patients to lie down for an hour after the injections.

STEPS NECESSARY FOR THE ERADICATION OF BILHARZIA FROM THE SUDAN.

If it is true that antimony tartrate kills the bilharzia worms *in situ* and renders the ova already deposited sterile, then we have a very powerful ally in the work of eliminating bilharzia disease from the Sudan.

We know that it is chiefly the school children who are infected, and who are, therefore, chiefly responsible for the propagation of the disease.

We know from our work on the boys of the Gordon College, Khartoum, that the treatment may be practically and safely and systematically applied, and that it is not necessary even to interrupt their educational studies.

Now these Government schools exist all over the Sudan, and both the Gordon College authorities and the boys themselves are anxious to eliminate the disease, the boys presenting themselves spontaneously for treatment.

If the schools in the affected out-stations were taken each once a year—each boy's urine and faeces examined—a bilharzia index kept, and the boys suffering from the disease given a course of treatment, it seems to us that each year would mark a great step forward towards the eradication of the disease from the Sudan.

If, in addition, the male adults of the villages maintaining the schools were examined and those infected treated, the step taken towards the total eradication of the disease would be still greater. We think that through the schools, with the help of the school authorities (British), the governors of the provinces (British), and the native officials and sheikhs, bilharzia could be exterminated except for sporadic cases.

One need hardly point out the dangers and disadvantages—economically and physically—of having a disease like bilharzia so widespread, and spreading, in the Sudan.

It is undoubtedly becoming more widely spread and more common, and, as cultivation and population increase, it will go on increasing.

Nothing at all is done at present by the Sudan Government to keep it and other parasitic diseases

in hand. Treatment is left to the discretion of individual doctors practising. The medical department can do nothing; it has not the means.

It is difficult to get money for very necessary routine medical undertakings, and it is impossible to undertake extraordinary schemes without money and special organization.

Measures such as these should be in the hands of a peripatetic British doctor (helminthologist) trained for such work. He should have proper assistance and all the necessary equipment, without which any attempt seriously to tackle bilharzia and kindred diseases in the Sudan will be worse than useless.

Notes and statistics should be carefully kept and filed. Much valuable information would thereby accrue. The doctor should go from place to place and have at his disposal a mobile laboratory. But such measures as those outlined above will be useless if steps were not also taken to prevent bilharzia infection pouring in from Egypt as it does now, yearly, monthly, daily, and for this end the Egyptian Army medical authorities will doubtless like to co-operate. Every Egyptian soldier before coming to the Sudan should be examined for bilharzia,³⁶ and if found he should have a course of treatment and should be cured.

All soldiers already in the Sudan known to be suffering from bilharzia should have a course of treatment, and the same should apply to all civilian officials and employees and civilian traders and others known to have the disease.

Besides the above a great deal might be done through the instrumentality of schools educating the pupils by means of demonstrations and diagrams.

It is well known amongst the Sudanese who inhabit the villages where bilharzia occurs that it is caused by going barefooted. If the life-history of the bilharzia worm were taught in the schools together with the rôle played by the two species of the mollusc (hullinus and planorbis), then the children would be educated to know that the mollusc wherever found should be avoided or destroyed.

They could be taught the importance of clean water for drinking purposes and of uncontaminated water for bathing purposes, and simple rules relating to conservancy arrangements.

Much could be done through the schools, and, in point of fact, in the Sudan, where the school authorities, much to their credit, have so much influence, we are inclined to think that, working through the schools, in a few years it would be possible to eradicate bilharzia and other parasitic diseases, both by direct measures and by educational means.

As matters stand at present bilharzia is spreading rapidly in the Sudan, and it will in time become as great a curse and scourge there as it is in Egypt.

NOTE.—At a place named Ahu Zehad, in Kordofan, 164 miles east of Nahud (120 miles from

Darfur), nothing in the way of a village existed ten years ago. A good site for a town was selected on a hill and the town laid out. At this place there are now 6,000 inhabitants.

There is a large lake, or khor, in the vicinity from which the people get water, especially after the rains. The molluscs in this khor have become infected with bilharzia. At the school at Ahu Zehad I am informed that quite half of the boys have bilharzia.

The foregoing illustrates how a new town may easily become infected, and it indicates how bilharzia may be got rid of in a town by dealing with it through the school. There are many such places in the Sudan.

EOSINOPHILIA.

Various percentages have been worked out, some as high as 23 per cent.; but we have worked out the eosinophilia index afresh, and we find that there is an eosinophilia, though not always so high as some observers have found. That it is greater in cases which are complicated by intestinal parasites other than bilharzia, and that the high percentages were probably due to the presence of other intestinal parasites as well, which had been overlooked.

The results are tabulated and shown in addenda.

THE EFFECT OF BILHARZIA ON PHYSIQUE AND CHARACTER.

Bilharzia probably is accountable more than anything else for the indolence of spirit, want of character, and the backward condition of development of the Egyptian peasant (fellah), and, as he as a class includes 90 per cent. of the population, one might almost venture to say, the Egyptian nation.

Though 70 per cent. of the native fellahs in some localities are infected (Maccallan quoted by Leiper) the majority are unaware of the fact, or at least only suspect it, from noticing that in the cold weather they pass blood with the urine. Many are the deaths, but time cures the majority of cases of bilharzia at present, although it may take ten years or more to do so; during all this time the man is losing blood, and spreading infection broadcast. It is quite probable that the sallow, dirty complexion, the anæmic mucous membranes, and poor physique, the apparently patient, unambitious temperament of the modern Egyptian fellah is due largely to schistosome infection, and one might also add the utter lack of enterprise, initiative, ambition, and the lack of almost every positive quality which contributes to the estimate of character, good or bad.

One comes across Egyptians amongst the more fortunate classes who are not affected with bilharzia, prosperous, and by no means wanting in initiative or commercial enterprise, and one would naturally venture to think that the docile, dirty, slovenly, patient though not unindustrious, but unenterprising, unambitious, short-sighted, miserable fatalist

³⁶ And for other parasites such as ankylostoma and *T. nana*.

one associates with the type Egyptian, would be a very different person were he minus the parasites, particularly of bilharzia (and ankylostoma and *T. nana*) which are at once an overwhelming physical, mental, moral and economic handicap, which more than anything else have kept him shackled by invisible chains, and have retarded his civilization. Ninety per cent. of the population of Egypt have not advanced in civilization since the days of the Israelites of the Old Testament.

The modern Egyptian is handicapped by his parasites more than anything he has to contend with. They do not allow him to compete on an equal footing with his neighbours, or with other countries in the world's economies. It is almost certain that Egypt will never be able to take her proper place among the nations of consequence until she has got rid of the parasites which are poisoning her blood and consuming her energy. More requires to be done before any general statements are made, but these seventy cases of bilharzia, treated with antimony tartrate by intravenous injections, make it clear that in antimony tartrate we have a remedy for bilharzia of a specific kind and that we possess in this a means of eradicating bilharzia from Egypt and the Sudan and from other places.

The method of administration is simple and it is certain that it only demands infinite care and attention, such as are instinctively part of the mental equipment of every well educated medical man, for its success. It should not be used empirically, still less commercially by individual doctors at so much a dose or cure, but it should, like vaccination, be administered by the State.

The change in a bilharzia patient's appearance, in his expression, and in the colour of his mucous membranes and his skin after his course of antimony tartrate and after he has got rid of his other parasites from his intestines is so striking that it would lead us to expect great things from the Egyptian nation if bilharzia, and ankylostoma and *T. nana* could be eradicated from the country, and we think they could, if serious steps were taken to eradicate them. These measures should be taken through the schools, partly by means of direct treatment of the infected children, partly by introducing into the curriculum educative measures calculated to interest and instruct the rising generation and the nation about the diseases and the means necessary to eradicate them.

APPLICATION TO OTHER COUNTRIES.

In England, Australia and India sporadic cases have occurred (Leiper), and if this is a fact, it means that there is an intermediate host already present and waiting in these countries.

Carried from Egypt and the Near East by the soldiers who have assembled during the war, it may even take root and become endemic in those countries to which the infected soldiers return. Short of its becoming endemic bilharzia will certainly occur in those countries in the near future more commonly than formerly and will require

treating. If antimony is a cure—as we assert it is—it's application will ease a good deal of suffering and anxiety to infected soldiers and many thousands of pounds will be saved to the country, which would be spent otherwise in pensions.

CONCLUSION.

We have now had under observation cases of bilharzia treated by antimony tartrate nearly two years ago without a sign of relapse in the interval.

We trust that other observers will confirm our results and that antimony tartrate will take its place as a recognized specific cure for bilharzia and that it will be found capable of employment on a large scale for the great benefit of these countries (Egypt and the Sudan).

Obviously it must be used with caution and not only should the injections themselves be carried out with great care but it is equally important, especially whilst the drug is on trial, that patients should be thoroughly examined before the course of treatment is begun in order to discover whether they are suffering from other disorders and other parasites besides bilharzia. If other parasites are found, these should be diagnosed and, where possible, got rid of before the antimony tartrate is used.

LIST OF CASES.

Case No.	Name	1917		1918	
		Admitted	Discharged	Admitted	Discharged
1	Mohammed Atiyeh Shabini	June 5	July 28		
2	Abdel Mokarrem Ala Gabu Ahmed	" 10	" 1		
3	Abdel Aal Hamour	Oct. 23	Nov. 10		
4	Mohammed Suliman El Kebir	" 23	Dec. 5		
5	Okasha Mursal	Nov. 13	" 16		
6	Mohammed Awad	" 13	" 16		
7	Abdel Mula Mohair	" 17	" 16		
		1918	1918		
8	Mohammed El Hassan Omar	Mar. 2	Apl. 13		
9	Mohammed Mustafa Mohammed	" 4	" 13		
10	Ahmed Zazoug	April 6	June 2		
11	Ahmed Abbas	" 20	" 11		
12	Fadi Ali	July 13	Aug. 22		
13	Imam Mohammed	" 15	Sept. 26		
14	Nikola Eff. Saba	" 19	July 28		
15	Abdel Galil Mahmud	" 23	" 28		
16	Abdel Fatah Desouki	" 22	Aug. 28		
17	Dimitri Eliou	Aug. 13	Sept. 6		
18	Koleib Ali Taher	Sept. 1	Oct. 15		
19	Hassan Ibrahim El Saier	" 25	Nov. 30		
20	Yusef Wasif	Oct. 22	Dec. 16		
21	Mohammed El Tom	Nov. 14	" 16		
		1919	1919		
22	Daniel Abdu	Dec. 15	Jan. 12		
23	Said Aly Nassar	" 30	" 30		
		1919	1919		
24	Mohammed Abdel Aal	Jan. 8	" 30		
25	Abdel Rahman El Hagg	" 19	Apl. 7		
26	Raha Ahmed Sadik	" 28	Mar. 13		
27	Mohammed Hamad	" 30	" 29		
28	Kamel Selim	Feb. 1	" 25		
29	Osman El Amin	" 1	" 31		
30	Abdel Aziz Eff. Ahmed	" 7	" 10		
31	Hassan Mursal	" 8	" 21		
32	Abdel Magd Gasmullah	" 8	" 21		
33	Said Ahmed	" 8	" 23		
34	Abdel Ghani Abdel Aaleem	" 8	" 21		
35	Salah Bedaway	" 8	" 21		
36	Abbas Sherif	Mar. 10	Apl. 30		
37	Ahmed Mohammed El Gensaini	" 12	" 28		
38	Osman Suliman	" 17	" 28		
39	Yusef Tuhis	Apl. 2	May 29		
40	Mohammed Saleh Nimr	" 7	Apl. 26		
41	El Tiab Mirghani	" 7	" 26		

Case No.	Name	Admitted	Discharged	Case No.	Name	Admitted	Discharged
42	Mohammed Ali Mohammed	... Apl. 12	... May 12	61	Mohammed Hadia Mansur	... May 1	May 12*
43	Ahmed Fadl	... 13	Apl. 26*	62	Fadl Mahmud	... 1	8*
44	Mohammed Hashem	... 23	26*	63	Awad Abu Bakr	... 1	8*
45	Mohammed Osman Hamad El Mehk	... 23	26*	64	Mudather Aly El Bushir	... 1	8*
46	Yusef Mohammed Mahmud	... 23	30*	65	Mahmud Ramzy Hassein	... 1	8*
47	Abdel Gheith Abdel Magid	... 23	May 1*	66	Ahmed Beshir	... 1	12†
48	Mohammed Abdel Kheir	... 23	8*	67	Mahmud Abu Nassar	... 12	—
49	Mohammed Mohammed Ali	... 23	Apl. 26*	68	Ahmed El Sayed Saloum	Apl. 12	May 28
50	Babikr El Hag El Safi	... 23	26*	69	Asher Abdullah	... 29	25
51	Mohammed Abdel El Hakim	... 23	26*	70	Ahmed Mohammed	... 30	29
52	Mahmoud Mohammed Fadl	... 26	30*	71	Hassan Eff. Sherif	... 23	—
53	Mohammed Hamuda	... 26	30*	72	Mohammed Eff. Beshir	... 23	May 30
54	Mohammed Bohkari	... 26	30†	73	Farahat Amery	... 25	—
55	Aziz Ibrahim	... 26	30*				
56	Abdel Razak Abdel Hamid	... 26	May 1*				
57	Ahmed Abu Zeid	... 26	1*				
58	Baineen Bigrai	... 26	1†				
59	Mohammed Bukheit	May 1	6*				
60	El Bakr Musa	... 1	8*				

* Cases treated as Out-patients.

† Cases gave a history of vesical bilharziosis but no ova were found in the urine, although there was evidence of cystitis. These cases were not treated.

EOSINOPHILIA.

(A) Vesical Cases.

Case No.	Date	Duration	Leucocytes	Intestinal parasites	Polymorpho-nuclear	Mono-nuclears	Lympho-cytes	Eosino-philies	Transi-tionals	Myelo-cytes
1919										
*30	Feb. 6	20 years	300	Nil	46-00	19-33	15-66	18-33	—	0-66
31	" 10	6 months	500	"	24-00	43-40	16-20	7-20	8-00	1-20
32	" 10	5 years	500	"	34-00	38-80	15-20	4-40	4-40	3-20
45	Apl. 24	3 "	500	"	32-60	27-20	19-60	17-40	3-20	—
65	May 2	3 "	500	"	50-40	33-40	11-40	1-60	3-00	0-20
*45	" 24	3 "	500	"	16-60	40-20	12-60	27-40	2-60	0-60
*65	" 24	3 "	500	"	53-80	29-60	7-60	3-60	4-40	1-00
43	Apl. 24	9 "	500	1	22-20	38-00	28-40	7-40	2-80	1-20
44	" 24	3 "	500	1	43-80	24-80	11-20	15-80	3-60	0-80
*61	May 2	4 "	500	1	53-60	31-60	7-80	5-00	1-80	0-20
*43	" 24	9 "	500	1	33-80	39-20	8-40	16-40	2-00	0-20
*44	" 24	3 "	500	1	30-60	32-20	6-20	27-40	2-80	0-80
55	Apl. 30	?	500	1, 2	31-40	47-40	6-40	11-20	2-80	0-80
53	" 30	1 year	500	1, 4	17-60	45-00	9-80	23-00	3-80	0-80
67	May 12	2 months	500	1, 4	30-20	33-20	11-40	22-60	2-20	0-40
*46	Apl. 24	?	500	1, 3, 4	24-40	37-20	14-40	19-60	2-80	1-60
62	May 24	?	500	1, 3, 4	31-60	34-80	3-40	26-00	2-80	1-40
52	Apl. 30	2 years	500	1, 4	29-80	43-20	18-00	4-80	3-40	0-80
50	May 2	1½ "	500	1, 2, 4	67-00	17-80	9-20	4-20	1-60	0-20
57	Apl. 24	—	500	1, 5	38-80	23-00	12-00	22-00	2-60	1-00
50	" 30	—	500	1, 2, 5	24-00	52-00	15-80	5-60	2-60	—
47	" 30	—	500	1, 4, 6, 7	35-60	48-80	7-00	5-60	3-00	—
35	Feb. 10	3 years	500	3	23-00	45-00	10-20	14-60	5-00	2-20
48	Apl. 24	1 year	500	3, 4	32-60	30-40	16-80	18-00	1-60	0-60
34	Feb. 9	?	500	4, 5	53-80	20-40	11-80	9-00	3-80	1-20
33	" 9	1 year	500	1, 4, 5	29-20	16-80	15-00	34-60	2-80	1-60
56	Apl. 30	—	500	1, 2, 4, 5	33-00	36-40	13-20	14-60	2-60	0-20
64	May 2	4 years	500	1, 2, 4, 5	44-60	25-60	17-60	7-40	1-40	0-40
49	Apl. 24	½ year	500	?	46-60	13-40	13-60	24-00	2-20	0-20
*49	May 24	½ "	500	?	37-40	23-80	5-40	31-40	1-60	0-40
51	Apl. 24	4 years	500	8	43-80	23-40	11-80	14-80	4-60	1-60
*51	May 24	4 "	500	8	27-60	40-20	5-20	23-80	2-60	0-60
59	" 2	1 month	500	1, 2, 4, 8	28-20	21-80	15-40	30-40	3-00	1-20
25	Jan. 28	27 months	500	1, 2, 4, 8	27-00	37-20	19-60	9-60	4-40	2-20
54	Apl. 30	6 years	500	?	14-00	53-00	14-20	16-20	2-20	0-40
63	May 2	—	500	?	21-40	50-80	12-00	11-80	3-60	Latent 0-40 Latent

* = After course of antimony tartrate. It would appear from this table that a course of antimony tartrate increases the eosinophiles.

- | | |
|-------------------------|---|
| 1 = Amœbæ. | 5 = Oxyuris. |
| 2 = Flagellates. | 6 = <i>Ascaris lumbricoides</i> . |
| 3 = Ankylostoma. | 7 = <i>Tricocephalus dispar</i> . |
| 4 = <i>Tœnia nana</i> . | 8 = <i>Bilharzia mansoni</i> (in addition). |

QUANTITATIVE ANALYSIS OF URINE FOR ANTIMONY IN TWO CASES UNDERGOING TREATMENT.

ANALYSIS OF URINE.

First Case (No. 27).

Mohammed Hamad.

Date	Grains injected	Urine passed in 24 hours	Tartar emetic eliminated, grains
1919			
Feb. 3	0.5	—	Traces only
" 4	—	1850	None or traces only
" 5	1.0	1250	0.1
" 6	—	1300	0.1
" 7	1.5	—	None or traces only
" 8	—	1850	0.25
" 9	—	2250	0.27
" 10	—	1120	0.13
" 11	2.0	1300	0.13
" 12	—	1200	0.46
" 13	—	1300	0.21
" 14	—	1500	0.12
" 15	2.0	1500	0.30
" 16	2.0	2100	0.40
" 17	—	1750	0.49
" 18	2.0	1650	0.46
" 19	—	1500	0.45
" 20	2.0	1800	0.35
" 21	—	1450	0.55
" 22	—	1700	0.40
" 23	2.0	1900	0.40
" 24	—	1350	0.40
" 25	2.0	1850	0.44
" 26	—	1850	0.42
" 27	2.0	2230	0.53
" 28	—	1100	0.40
Mar. 1	2.0	1500	0.18
" 2	—	2050	0.49
" 3	2.0	1300	0.31
" 4	—	1300	0.36
" 5	2.0	1550	0.37
" 6	—	1550	0.60
" 7	—	1200	0.26
" 8	2.0	1150	0.26
" 9	—	1500	0.42
" 10	—	1450	0.35
" 11	—	1280	0.30
" 12	—	860	0.31
" 13	—	870	0.27
" 14	—	670	0.24
" 15	—	—	—
" 16	—	1120	0.13
" 17	—	1280	0.18
" 18	—	1110	0.11
" 19	—	720	0.14
" 20	—	1080	0.20
" 21	—	1120	0.26
" 22	—	1100	0.17
" 23	—	920	0.15
" 24	—	1300	0.20
" 25	—	1080	0.21
" 26	—	1060	0.08
" 27	—	1150	0.04
" 28	—	1100	0.03
" 29	—	1080	0.04
Total	27.0	71,650	14.44

ANALYSIS OF URINE.

Second Case (No. 30).

Abdel Aziz Eff Ahmed.

Date	Grains injected	Urine passed in 24 hours	Tartar emetic eliminated, grains
1919			
Feb. 9	—	1050	0.08
" 10	—	970	0.03
" 11	—	900	0.35
" 12	0.5	1000	0.04
" 12	1.0	980	0.04

Case No. 30 continued.

Mohammed Hamad.

Date	Grains injected	Urine passed in 24 hours	Tartar emetic eliminated, grains
1919			
Feb. 14	1.5	1150	0.11
" 15	—	1200	0.28
" 16	2.0	1450	0.30
" 17	—	1220	0.34
" 18	2.0	1220	0.39
" 19	—	800	0.42
" 20	2.0	860	0.30
" 21	—	1250	0.50
" 22	—	1100	0.44
" 23	2.0	1000	0.30
" 24	—	900	0.36
" 25	2.0	980	0.35
" 26	—	1100	0.40
" 27	2.5	1100	0.44
" 28	—	1050	0.42
Mar. 1	2.0	1800	0.14
" 2	—	1200	0.58
" 3	2.0	1280	0.51
" 4	—	1600	0.60
" 5	2.0	1850	0.52
" 6	—	1250	0.57
" 7	2.0	1600	0.48
" 8	—	1800	0.65
" 9	2.0	1870	0.52
" 10	—	1200	0.48
Total	26.0	36,790	10.625
April 1	—	380	Small quantity
" 8	—	250	"

These specimens were passed for the daily inspection and sent to the laboratories for quantitative tests for antimony tartrate.

Patients had not been treated with any drugs during, or before, or after, the course of antimony tartrate so that the analysis for antimony tartrate could not be invalidated on this account.

Review.

FEVERS IN THE TROPICS. By Sir Leonard Rogers, Kt., C.I.E., M.D. Pp. 404, plus xii, with coloured frontispiece. London: Henry Frowde and Hodder and Stoughton. Third edition. 1919. 30s. net.

This book, for ten years a standard work, requires little comment; one can say to those who know Rogers's fevers, all things tropical shall be added to them; those who do not know Rogers do not know kala-azar or all there is to know about malaria. So much new work has been done by recent investigations on tropical disease, both in acute and chronic phases, that this book should be at hand for all practitioners and students in all parts of the Tropics. Officials know only too well the defects of medical arrangements throughout the Tropics. One way to obviate this is to make suitable provision for both these some time qualified and for all students to have the best British literature on the diseases of their own countries; for this end there is no better book.

Original Communication.

BLACKWATER FEVER.

By J. P. WILLIAMS, M.R.C.S., L.R.C.P.

DURING the past four years, ten cases of blackwater fever have been under my care in hospitals on the Gold Coast.

The previous history of these ten cases showed, without exception:—

(1) That they had never taken quinine as a prophylactic, according to any recognized system, although each had resided several months in an endemic area.

(2) That each of them had, for some three to six months preceding the onset of blackwater fever, suffered from repeated attacks of malaria, which they had either "treated" themselves or neglected to carry out the instructions of their medical attendant.

The treatment I employed in these cases may be summed up as follows: (a) Careful nursing; (b) *drugs*; (c) vigorous hydrotherapy; (d) precautions against heart failure, particularly during convalescence; (e) *invaliding*. In addition to the ordinary four-hour temperature chart, it is of the greatest importance to keep a chart of the total volume of all fluids, both administered to, and excreted by, the patient. The urine in particular should be accurately measured, and specimens of each portion passed placed in a series of labelled test-tubes. These test-tubes should not be in a place where they are visible to the patient. A blackwater case is invariably in a state of great mental anxiety and every precaution should be taken to prevent him from seeing his urine. For this reason also, the use of enamelled or earthenware urine bottles is preferable to those of glass.

The patient should never be left without a competent attendant, and the necessarily frequent operation of changing clothing and bedding performed with as little disturbance and exposure as possible. Immediately upon admission the patient was given a concentrated intravenous injection of 20 centigrammes of galy into one of the ante-cubital veins, and an intramuscular injection of 9 gr. of quinine bihydrochloride into the gluteal region. The galy injection was repeated on the third day and the intramuscular quinine injection repeated every twelve hours until the graver symptoms subsided, the oral administration of 5 gr. three times a day being then substituted.

In the majority of my cases, Sternberg's mixture (150 gr. sodium bicarbonate, $\frac{1}{2}$ gr. mercury perchloride in a quart of water; 1½ oz. every hour) was of great value, affording relief in persistent vomiting and abdominal discomfort; the alkali apparently neutralizing excessive acidity and the perchloride of mercury probably inhibiting abnormal gastric fermentation.

Vigorous hydrotherapy, both oral and rectal, was commenced as soon as the patient came under

treatment, and a profuse perspiration induced by means of a hot pack, applied for three hours and repeated in some instances. The hot pack, in addition to its diaphoretic action, invariably relieved the acute abdominal and lumbar pains. By the rectum, 4 oz. of warm saline was given upon admission, and repeated every four hours, the quantity being increased to 8 oz. To avoid causing any rectal irritation which would militate against the absorption of these frequent salines, the greatest care should be exercised in their administration, a long, well-lubricated rectal tube being carefully passed 4 to 6 inches beyond the anus, and the funnel raised not more than 18 inches above the patient's body; the rate of flow should not exceed 1 oz. per minute.

In grave cases $\frac{1}{2}$ oz. of brandy was added to each saline. Dextrose was not available, otherwise I should have used it. A previous cleansing enema of soap and water is not usually necessary, and is best avoided. The same remark applies to purgatives, e.g., calomel and jalap. The average blackwater case has frequently had some diarrhoea prior to the onset of hæmoglobinuria and even should scybala be present they will usually be removed by the first saline enema, subsequent salines being retained.

The oral administration of hot, watery fluids, e.g., sweetened lime drinks, barley water, or even plain warm water was encouraged up to the point of compulsion, and in addition to the fluid administered by the attendant, a supply should always be placed within the patient's reach, so that he can drink it whenever he desires. Not infrequently in this manner a patient will drink a pint an hour, and maintain this rate for several hours, profuse diaphoresis and diuresis resulting.

The acidity of the hot lime drinks customarily given in the Tropics is a disadvantage; warm barley water is preferable; aerated water should be avoided as much as possible. A blackwater fever patient's stomach is invariably in an irritable condition, and the gas evolved therein from the inhibition of large quantities of aerated water tends to increase the discomfort. Persistent vomiting and hiccough were treated by Sternberg's mixture administered hourly, ice to suck, and a mustard plaster applied to the epigastrium.

Throughout the illness and for at least seven days after the cessation of the hæmoglobinuria, patients were kept strictly in a recumbent or semi-recumbent position. During convalescence, diet was light, nutritious, and given in small quantities at frequent intervals. Invaliding to a temperate climate was necessary as soon as the patient was fit to travel, and he was advised to take quinine hydrochloride in 5-gr. doses thrice daily for at least a month, together with an iron and arsenic tonic.

The result of this treatment in these ten cases were: eight recoveries and two deaths. Of the latter one did not come under treatment until the third day of the disease, when the prognosis was almost hopeless, death occurring on the fifth day. The

other fatal case had recently been infected with *Treponema pallida*, death occurred on the third day.

My conclusions formed upon these ten cases are:—

(1) That the previous history in each case tends to show that the blackwater fever of West Africa is a manifestation of recurrent and inefficiently treated malaria, and that this is further supported by the fact that immediate and repeated intra-muscular injections of quinine, combined with galyl injected intravenously and vigorous hydro-therapy is a satisfactory treatment.

(2) That the prophylaxis of blackwater fever is essentially that of malaria.

(3) That in Galyl we have a very important remedy, since it apparently has (a) a stabilizing effect upon the hæmoglobin and therefore an anti-hæmolytic; (b) an anti-parasitic action; and (c) an accelerating effect on the formation of red blood corpuscles.

In one grave case in which it was successfully used, the hæmoglobin (Tallqvist) was only 20 per cent. of the normal.

Further, in no case of blackwater fever in which I have used it have any ill-effects attributable to galyl appeared.

(4) That no person who has suffered from blackwater fever should return to an endemic area until after at least four months spent in a temperate climate, and that the return should be conditional upon an undertaking being given to faithfully observe the conditions necessary for the prophylaxis of malaria, e.g., the taking of quinine as a prophylactic according to a recognized system, and the proper use of a mosquito net. Otherwise there is a grave liability to a second attack, which would probably prove fatal; and further, people who hold, as the above patients did, that it is not necessary to take quinine systematically in West Africa, are, by spreading their pernicious doctrine, a danger to other Europeans.

THE ÆTIOLOGY OF BLACKWATER FEVER.

By WALTER E. MASTERS, M.D., M.R.C.S.

It is now widely appreciated that blackwater fever is not a disease *per se*, but a symptom resulting from the selective action of powerful toxins upon the red blood cells or from a decrease in the osmotic tension of the blood plasma in malarial subjects. There is much evidence to show that the condition occurs in malarial patients inadequately treated by quinine, the symptom manifesting itself during the first two years of tropical residence in the majority of cases. The theory of malarial toxicity and other factors is now gaining ground.

The solution of the red cells may take place in one of two ways:—

(1) By a decrease of the osmotic tension of the

plasma, so that water passes into the red cell and distends the capsule until it bursts. According to McCay it is the sulphuric acid in the form of quinine sulphate which produces the hæmolytic action, but some of my cases have never had any other quinine than the hydrochloride, which variety, according to the same author, increases the osmotic tension, and thus protects the red cell from rupture. Those who hold this view are in the minority.

(2) The solution may take place by some toxin acting upon the cell membrane, causing it to deteriorate, rupture and discharge its contents into the plasma, which is probably the correct view.

The factors of toxins having the selective action upon the red cell membranes are but little understood.

In considering this question one excludes that form of "blackwater fever" caused by the congestion of the urinary tract, followed by hæmaturia, as the cell membrane in such cases is not ruptured. The condition is one of hæmaturia and not hæmoglobinuria.

In my opinion a malarial toxin is a *sine quâ non* for blackwater fever, but it is not a sufficient cause in itself to cause a solution of the red cell membranes. Some other toxin must also be present. Stephens states that the blood of persons examined the day before the hæmoglobinuria contained parasites in 95 per cent. of cases. This was confirmed by Deeks and James in Panama. Blasi and others have demonstrated a hæmolysin in malarial blood. Being given then the primary factor insufficient in itself, what other factor or factors are necessary? It has been said that a "depressing influence" will cause blackwater in a malarial patient, but the term is vague and may mean anything mental, physical, chemical, &c. In some of the writer's cases the extra active factor has been:—

(1) Quinine, irrespective of its variety of salts.

(2) Galyl, neosalvarsan, and kindred preparations.

(3) *Male fern*, followed by alcohol; chronic malaria being present in each case.

EXAMPLES.

(1) A. R., Belgian Congo. Repeated malarial attacks, took quinine periodically in large quantities "like sugar." He had a typical attack of hæmoglobinuria.

Cause of attack: Malarial toxin plus quinine.

The late Dr. Sandwith told the writer of a malarial case of his in London which had a typical attack of blackwater after 5 gr. of quinine. Dr. Sandwith advised me never to begin with more than 2 gr. of quinine in malarial cases. In Panama and Colombia I have, however, given 20 gr. and 30 gr. of quinine daily without causing blackwater, the critical condition of the patients needing urgent drastic quinine treatment.

(2) C. B., Belgian Congo. Weak, emaciated, fell down repeatedly from sheer exhaustion. Tape-

worms for years. Had had repeated malarial attacks; took quinine spasmodically. Admitted to hospital for tapeworm, which was cleared out by male fern. The patient absconded the same night, later admitted drinking "six beers, &c." Within ten hours was heavily jaundiced; passed one lot of black urine. Patient died on the fifth day from uræmia. No quinine given.

Cause of attack: Malarial toxin plus male fern plus alcohol.

(3) F. D., Gold Coast. Long-standing malarial cachexia patient. Spleen three fingers below costal margin. No pyrexia. Begged for "606" for his chronic condition. Given galy, 40 cg. In a few days a severe rapidly recurring attack of blackwater supervened, followed by death.

Cause of attack: Malarial toxin plus galy.

The writer would be glad if other tropical workers would enumerate what their clinical experience has shown them to be the exciting causes of hæmoglobinuria in given cases either through the medium of this journal or privately.

It is probably not widely appreciated by the rank and file of busy practitioners that potent remedies like large doses of quinine, galy, male fern, thymol, &c., are not administered to malarial subjects without danger.

*Prestea, Gold Coast,
March 30, 1919.*

THE OCCURRENCE OF CARCINOMA IN THE LIVER OF A LEPER AND OF SQUAMOUS EPITHELIOMA WITH TUBERCULOSIS IN A COW.

By J. B. CLELAND, M.D., Ch.M.(Syd.),

Principal Microbiologist, Department of Public Health, Sydney.

(From the Microbiological Laboratory, Department of Public Health.)

THERE is a vague general impression that malignant disease rarely occurs in tubercular persons. It is even hinted that the tubercular soil is unfavourable to the development of malignant processes.¹ From time to time, however, instances have been given showing the co-existence of the two diseases. The explanation why they are rarely found together probably lies in the fact that each disease is accompanied by a high mortality over a relatively short period of time, thus giving little chance for the development of two independent morbid processes in the one individual. Another explanation may be that tuberculosis specially affects younger people, whilst malignant disease appears most frequently in those of middle or old age.

¹ Thus Dr. I. Holmgren, whilst Medical Superintendent of St. Goran Hospital in Sweden, made autopsies on three or four thousand tubercular subjects, and was struck by the complete absence of malignant growths. He thought it possible that the tuberculin toxins might possess an inhibitive action on the growth of cancer cells.

As leprosy is due to an acid-fast bacillus belonging to the same group as the tubercle bacillus, it seems of interest to record the co-existence of a carcinoma involving the liver with leprotic lesions involving the same organ as well as other parts. Attention may be called to the finding of leprosy bacilli even in the delicate stroma between masses of invading malignant cells. The slow clinical course of leprosy, often to be estimated in many years, offers naturally a much better opportunity for the independent development during middle age of malignant disease than does the more rapid progress in general of the tubercular process. Consequently one would expect to find more cases of malignant disease developing during the course of leprosy than during the course of tuberculosis.

This case illustrates again the fact that there appears to be no direct antagonism between diseases due to acid-fast bacilli and malignant processes.

For the following clinical notes I am indebted to Dr. D. Wallace, Acting Superintendent of the Coast Hospital, Sydney, under whose care the patient was.

"F. H.," male, native of China, aged 48 years, admitted May 25, 1916, died June 15, 1916. The patient was seriously ill and dropsical on admission; his illness gradually progressed until June 14, when he became suddenly worse with deep jaundice.

A post-mortem examination was made on June 15. The skin was deeply jaundiced; there was a large amount of recent blood clot in the lesser sac of the peritoneum, apparently from a ruptured vessel in the liver; the pancreas was enlarged and oedematous. The liver was greatly enlarged and the surface thickly seeded with pea-sized nodules; on section it was seen that these nodules were evenly distributed through the whole substance. The spleen seemed normal on section, but the surface presented an area with a thick, almost calcified, capsule. The other abdominal organs were apparently normal. The thorax was not examined.

The medium nerve and the liver were submitted for further examination to the Microbiological Laboratory, with results as follows:—

Macroscopically, the median nerve showed no definite lesions. The liver showed various sized soft whitish malignant-looking masses with fibrosis between them; the organ was bile-stained.

Microscopically, sections of the liver showed multilobular cirrhosis, extensive in places, less so in others, the fibrosis occasionally becoming interstitial so that whole lobules were infiltrated. Small hæmorrhages had occurred in places into the dense strands between lobules.

In addition, the tissue was extensively infiltrated by large carcinomatous masses, sometimes degenerated, with outlying smaller masses. The carcinomatous cells were very large and "juicy," and sometimes contained large multilobed nuclear masses and sometimes showed mitoses. Occasional small masses of bile pigment were found in the cells in situations far removed from unaffected lobules. The appearance of the growth was that of a primary carcinoma of the liver.

Leprosy bacilli, some scattered, some in small globi, were scattered through this stroma. They were found in the dense cirrhotic areas around lobules, in the finer cirrhosis between the cells, and occasionally in the delicate stroma between masses of malignant cells. In places few leprosy bacilli were seen, whilst in other similar areas they were easily found.

Microscopically the median nerve showed a slight patchy fibrosis between the nerve fibres. An occasional lepra bacillus was detected.

In connection with this case it may be of interest to record the occurrence of squamous epithelioma of the eye in a tubercular dairy cow in New South Wales. There were hard tubercular masses in the udder, and the lymphatic glands draining this area were much enlarged and caseous. Abdominal lymphatic glands, probably retroperitoneal, were also much enlarged and caseous, whilst the serous coat of the rectum showed a number of reddish polypoid growths. In the eye there was a fungating growth involving the nictitating membrane and the external corner of the eye.

Sections of the udder and the two sets of lymphatic glands showed numerous large giant cells with plasma cells and extensive caseation and the presence of very numerous tubercle bacilli. The polypoid growths of the rectum showed abundant moderately large thin-walled vessels with numerous large giant cells lying between them; a single doubtful tubercle bacillus was seen in these sections. The growth of the eye showed typical squamous epithelioma with cell nests. No tubercle bacilli were seen in this growth.

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AUGUST 1, 1919.

CHANGE OF AIR.

THE term change of air in popular parlance signifies a change of environment for the purpose of regaining health after disease, or being run down from fatigue, be it mental or physical. Different

peoples express the same idea in other terms; thus a Chinaman says he is going for a "change of water," and one cannot help thinking that perhaps he is more correct in his phraseology. He evidently regards the water he drinks as the cause of the state of health he finds himself in and not the air he breathes. We go to drink the waters of this or that spa as a remedy for our varied ailments without a mention of the air part of the cure, so that perhaps the Chinese expression is the more correct. Others go for "a change" without specifying further what the meaning or the nature of the change about to be taken is. It would seem that a "change" away from home, wherever that home may be, is a habit which obtains amongst people in almost every quarter of the globe. People dwelling inland go to the seashore, and those by the sea go inland; the dweller on the plains desires to get to the hills and *vice versa*. The cause for these migrations, which we take for granted as a yearly necessity, must be deep-rooted, for it is well-nigh universal. The word migration we are accustomed to apply to bird-life habits and it may be that their migrations are on the same footing as man's change of air or water. We know that bird life is widely pervaded with the habit and it may be that the changes we take are but an inheritance from the bird habit. The bird we invariably think of when the subject is mentioned is primarily the swallow; but many birds, in fact most, if not all birds, seek change. The robin we know is with us summer and winter, but it is believed that the winter bird is not the same variety as the summer bird; but whether the summer bird goes north or south, allowing that it does either, is not known; we infer that the winter bird has come from farther north and the summer bird goes south without accurate knowledge of the matter, but the exact opposite may obtain for all we know.

That many animals, however, get no change is abundantly evident. Cattle, horses, pigs, dogs, and many of the indigenous animals we are intimately acquainted with continue from generation to generation without changing their habitat, and many of our fellow-beings take no "holidays" away from home, or at most, a day or two to the country or the seashore. That the desire to do so exists is apparent. The "Fresh-air Funds" to give town children a change to the country and country children a day by the sea, is evidence of the ingrained desire for change which permeates all mankind. It is easy, no doubt, to explain away this inherent desire. The search for food and a suitable place in which to rear their young are the determining factors in the case of many bird tribes, no doubt; but on the other hand the stationary habit of the four-footed animals around us annuls the universality of the desire or necessity for the movement. It must, however, be remembered that our farm animals are artificial products, and that these animals in their natural and wild state do roam about from place to place, no doubt, in search of food; yet it is a change of *locality* for them be

the cause what it may. Moreover, even in our farm animals we know that an importation of fresh blood into the stock is fraught with advantage and becomes after a time a necessity, otherwise degeneracy results and the animals become weedy. Farm servants, it may be said, are tied to the soil and seldom if ever take holidays or go for a change; yet they change their places from time to time, be their masters ever so kind and considerate; and their going is considered an ungrateful thing when they seek employment elsewhere. This migration, however, may be and probably is due to the inherent desire for change which would seem to pervade all living beings. The instinctive principle may lead to greater and wider migrations, and may explain the continuance of war in the world. In seeking for the cause of war between nations and peoples we ascribe it to this or that local cause, a murder of some potentate or high official, an interference with the border line of neighbours, the desire for this or that piece of land because it is richer in mines or yields better crops, or any of the many trumpery causes to which we are wont to ascribe the origin of the conflict. If, however, we accept the migration tendency of mankind we may be nearer the truth in our search for the truth, and might regard the local trouble as a mere camouflage of the real cause. By doing so the explanation of the persistency of wars throughout history is readily understood, and the continuance of warfare as a certainty beyond the power of Leagues of Nations and Hague Conventions to prevent.

Another phase of thought in this direction occurs in the case of leave from work in the Tropics, a subject which is fraught with many points of difficulty. Taken from the commercial or business point of view it comes to this: How are spells of work and leave to be arranged to the benefit of the employer? Does it pay the employer (leaving the humanitarian point of view out of the question) to work his employee to the utmost limit of his endurance or to let him return to his native land before the climate begins to tell upon him? Allowing that it does pay the employer, it does not pay the nation. For that crippled man may become a burden to the State. Having taken as much out of the man as possible, and to such an extent that return to the Tropics is impossible, his place has to be taken by a novice in business and one who is not inured to tropical life and, therefore, is liable to early breakdown under a contracted ailment. It is plain that the employer loses thereby, and the plan is not likely to be followed by any but unwise business companies. How frequent and how long the leave should be cannot be set down upon any general principle, for climates differ and each requires a law unto itself. Where that leave should be spent again arises. Will a change say from Southern China to Japan or America do as much good as a change to his native land, Britain, Australia, or wherever the native land may happen to be. The birds return to their native habitat with a persistency which is one of the marvels of Nature. The same swallows go to their

former nesting place not only to the same country, but to the same parish and to the very spot in that parish where they were the previous year.

Our emigrants to the overseas countries after a time long for a visit to the old country, and not a few return to end their days in their native land, be their birthplace ever so humble. Others would do so, but from various reasons, sometimes family ties, sometimes from pecuniary circumstances, cannot manage to fulfil their longings. The instinctive desire played a part perhaps more than we are aware of for the support the overseas dominions gave in the Great War, although the fact is lost sight of and ascribed to Imperial circumstances and other reasons which may blur the instinctive and real reason for their so doing.

The tropical resident in starting for home, unlike birds, frequently graduates the change from the tropics by spending a month or so in the north of Italy or South of France, so as to gradually get accustomed to a colder climate. On reaching Britain they choose all too frequently the South of England as being warmer than their native place, which might have been Yorkshire or Scotland. This is a plan experience has shown us that has nothing to recommend it. They are suffering from tropical heat and the cure for that is the bracing effects of a cold climate and not the tepid atmosphere of the south of France or the south of England.

The most recent plan for treating patients with a big spleen or other effects of malaria is to send them to the hills of Switzerland during the winter months. This plan has proved most beneficial, so that many experts advise winter leave be granted to tropical residents, especially those suffering from chronic malaria. It is only a few years ago that the writer initiated this plan of treatment; it has been interrupted by the war for five years, but when Switzerland is once more available the treatment will be renewed and recommended with increased vigour, for we now have experience to support its pursuance. A spell in their native land and a month or six weeks—from the first week of January to the middle of February when the weather in Switzerland is most settled—is the regime recommended, and few instances—none that the writer can remember—of failure of success in such a step are to hand. Change of water and change of air are combined, of course, in all changes of locality, and the Chinese legend is just as true as the one we express it by, change of air. A change of environment is the real factor, but the word environment is a clumsy phraseology, but if we understand that whether we use air or water as meaning environment it matters not what the phraseology may be.

J. C.

Abstract.

GENITAL DEFECTS AND VENEREAL DISEASES AMONG THE PORTO RICAN DRAFT TROOPS.¹

By H. GOODMAN.

THE calling up of 12,000 men between the ages of 21 and 31, nearly all natives of Porto Rico, gave an opportunity to study the genital defects and venereal diseases, including syphilis, prevalent in one of the West Indian islands where syphilis is supposed to have had an early start.

Especial interest should be manifested in the report of syphilis among the troops, as evidenced clinically, and by the Wassermann reaction taken as a routine on bakers and cooks. The Wassermann reports were in accord with the clinical findings in every case of secondary syphilis, and in cases of primary syphilis in which the draining lymph nodes were enlarged. In the latent tertiary cases, negative Wassermann, reports were returned in only six cases that treatment with mercuric salicylate in grain doses weekly for six weeks provoked a positive reaction. It might be well to note that in every case the only information the laboratory had was our serial number. We believe, from correlating the clinical findings with the laboratory reports, that the latter are trustworthy as indicating syphilitic infection, and do not hesitate to base conclusions on them.

PORTO RICO.

In the report of his observations on the skin diseases of Porto Rico, King² gave a brief description of the climate and people of Porto Rico, because few persons have any adequate idea of the place, and it would afford readers a better appreciation of the diseases under discussion. King, who is a trained observer and has spent many years on the island, said:—

Porto Rico, lying on the eighteenth degree of latitude, comes within the geographic boundaries of the "tropics," and the prevalent American idea, fed by popular fiction, pictures the West Indies with a hazy mixture of extreme heat, palm trees, and scantily clad "natives," with dread diseases of all kinds lurking in all corners.

In Porto Rico palm trees are plentiful, to be sure, but the climate, while warm, is tempered by sea breezes along the coast and by the altitude in the interior. It is seldom sultry, even in the hottest months, and the summer averages cooler and more pleasant than in the United States. There being but comparatively slight difference between summer and winter, the climate is monotonous, and the uninterrupted warmth probably has important etiological influences acting directly or indirectly

¹ Abstracted from the *Journ. Amer. Med. Assoc.*, March 29, 1919.

² King, W. W.: "Some Observations on the Skin Diseases of Porto Rico," *J. Cutan. Dis.* 35: 459 (Aug.) 1917.

through its effect on the susceptibility of the person, on the organisms which cause disease, or on the agencies which may transport disease.

The people of Porto Rico are descended from two principal sources: the European settlers, chiefly Spanish, and the slaves imported from Africa, the aboriginal element having been so nearly exterminated in the early days of colonization that it may practically be ignored. A fairly numerous foreign contingent is composed of Europeans and Americans, and a recent immigration of a few thousand negroes from other West Indian islands. We have, therefore, in Porto Rico a mixed population, the white race greatly predominating, the black race in much smaller number, and a large element of the mixture of the two races in varying proportion. The habits of the people and the conditions under which they live and work are those of the tropics rather than those of the temperate zones, and apparently most tropical diseases, including those of the skin, should find suitable conditions for development. At the same time, the island is not so far removed geographically, climatically, or in other respects from temperate climes, but that the diseases of those regions might also find conditions more or less suitable to them.

GENITAL DEFECTS.

The present study was more from the adult men of such a population. The scrutiny of admitting officers and the inspectors after assignment to companies tended to put into the hands of the venereal officer a larger number of suspects than would ordinarily volunteer for consultation. It is not surprising, therefore, that almost 10 per cent. of the men of the command have been observed by this officer in the three months that the men have been in camp; 1,163 patients have been registered at the venereal infirmary.

Hydrocele is one of the most common genital defects found. It is almost an insular characteristic. The cause is variously given, but the prevalence of filariæ is generally thought to be the etiologic factor. Fifty-two men came to the infirmary with hydroceles of various sizes. In not a few, it is no exaggeration to say that the scrotum hung as low as the knees. Strange to say, a hydrocele of more than moderate size, and usually bilateral, gives the Porto Rican no apparent discomfort. For many years the trousers made on the island allowed for the extra mass. Many men wear suspensories, as might readily be supposed, but more for appearance than for comfort.

Elephantiasis of the scrotum accompanies few of the cases of hydrocele. The *Filaria sanguinis-hominis* is the etiologic factor here as in hydrocele. In men already passed as fit for military service by local boards, large scrota were not seen.

Varicocele has not been of common occurrence. In only two cases was this noted to be at all large, and in one of these there was an accompanying completely descended scrotal hernia.

Cryptorchism, or undescended testicle, was found

in only one man. There was no palpable mass either along the canal or in the left half of the scrotum. There was no scar of operation or injury, and the man stated that he had never had more than one testicle.

Phimosis was a common condition. In many cases the opening was extremely small and the flow of urine impeded. The preputial cavity became an accessory bladder, so to speak, from which the urine slowly found its way.

Seven cases of cicatricial phimosis were recorded. Wassermann tests were always taken on the patients, but the results were negative.

One patient with gonorrheal urethritis had an exceptionally tight prepuce as a therapeutic obstacle.

Balanoposthitis is a common condition in phimotic cases; but, in addition, the almost universal disregard for cleanliness under the foreskin even when it can readily be withdrawn. The skin of the glans and the mucous surface of the prepuce become soggy, moist eroded, and even ulcerated. Considering the possibility of the erosive chancre in these cases, *Spirochaeta pallida* was searched for, and Wassermann tests repeatedly taken in these patients.

Paraphimosis was seen twice. Once it was a complication of acute gonorrheal urethritis.

Redundant prepuce is a relative term, to be sure, but all our men would be benefited by circumcision. In every individual examined, the entire glans was covered completely, and usually there was an inch to spare.

Operation was advised only in those cases of extreme phimosis in which it was not possible to expose the meatus urinarius. These men, we thought, were not safe for field duty.

One case of congenital stricture of the meatus urinarius was observed. Unfortunately for this man, the stricture was large enough to admit the diplococcus, although the tip of the urethral syringe was too large.

Urethral stricture was encountered only in those cases in which there were symptoms. In two of these the stricture had tightened down so as to admit only a filiform bougie. We are told that the urethra of the Porto Rican is almost as subject to excessive scar formation as that of the negro, and that stricture is locally regarded as part of the course of urethritis.

Tinea cruris, or the eczema marginatum of the older writers, was encountered in only three cases. We have diagnosed tinea of the crural region, armpits and toes in the same case.

Sebaceous cysts of the scrotum are common among these people. Although we registered only three at the infirmary, we have seen scores at our inspections that were never examined at the infirmary. The tumours are always multiple, and we have counted as many as seventy of all sizes on one man.

Pediculous pubis was found twenty-four times in one regiment within a few days; recognizing an

impending epidemic, we took measures that limited the ravages of the pediculus.

FRAMBÆSIA, OR YAWS.

We recognized two cases of frambæsia, or yaws, among the enlisted men. Each already presented the generalized eruption of crusts under which were the strawberry pulpy masses. The *Treponema pertenue* of Castellani was demonstrated in the lesions from both patients, and the Wassermann test was + + + in both men. One patient was treated with 0.3 grm. of arsphenamin at weekly intervals for two weeks, and the lesions easily receded. The presence of concomitant syphilis must always be considered, but yaws is known to be one of the diseases that gives a "paradoxical" positive Wassermann test in the absence of syphilis.

REPORT OF CASE.

The patient treated for yaws at the camp was a private, aged 24, who had been in service two months. He presented about twenty-six lesions, which were crusted, umbilicated and dry. Under the crusts was a moist, papular pulp. *Treponema pertenue* was demonstrated in smears. The Wassermann test, August 7, 1918, was + + +; August 21, + + + +; September 13, + + + +. August 22, 0.3 grm. of arsphenamin was administered; August 28, 0.3 grm., and September 16, 0.4 grm. September 3, 1. gr. of mercuric salicylate was given. The delay in initiating treatment was incident to the transfer of the patient to the base hospital and his return to camp.

URETHRITIS.

We were careful to instruct all company commanders to get their men who had or had had venereal disease to volunteer for treatment. If on future examinations, they were told, venereal disease was disclosed, they would be punished. In this way many chronic cases were disclosed in which treatment was required. In a few cases, syphilis or gonorrhea was acquired prior to entry into the service, but the incubation time was spent in the camp. One case that had graver consequences than most was that of an accepted candidate for the officers' training camp. On the night before the opening of the camp, he took his last "flog." He passed his initial examinations after entrance. About five days after, he noticed a serous discharge but laid it to the unaccustomed physical exertion. The primary stage of the urethritis passed into the purulent period and he was speedily taken from the ranks. The finding of the gonococcus of Neisser in smears shattered this man's hopes for a commission.

In a few cases, an unrecognized and not reported chronic urethritis developed acute exacerbation after varying periods of drill. These men were sent to the base hospital. If the man had had a pass since entry into service, it became a nice task to distinguish between a case of urethritis acquired prior to entry or since entry into the service.

A number of men admitted to the army with venereal disease were immediately sent to the base hospital for treatment. Under the old laws of en-

listment, these men would have been rejected; but the Selective Service Regulations wisely provided for unconditional acceptance in all cases of gonorrhea, acute and chronic, and of syphilis with remediable manifestations.

We hesitate to say that infection was acquired with intent to evade military service, but it is certain that at least 25 per cent. of these men acquired their infection between the time at which they learned they were going to camp and the time they actually arrived there. One thing that led to the belief that venereal disease would disqualify for service was the fact that members of the officers' training camps were discharged from the camps if they developed gonorrhea or syphilis. In a circumscribed community as this island is, such discharges and the causes thereof speedily become public property among the registrants.

One hundred and fifty-three cases of acute or subacute urethritis were registered. Of these men, ninety-eight with purulent, bacterial urethritis were sent to the hospital as incapacitated for field service. The subacute cases require a word further because in this island urethritis has an extended period of virulence. The reason is the universal practice of self-treatment, for among all classes of society the milk of the coco-nut is regarded as specific for urethritis. The favourite prescription is a dram of Epsom salt placed into the opened nut and taken in the morning. The élite use a gramme of sweet spirit of nitre instead of the more proletarian Epsom salt. An average coco-nut contains 500 c.c. of fluid, so the therapy satisfies the thirst, irrigates from within, and the dram of magnesium sulphate has a physiologic effect on the bowels.

Of chronic cases of urethritis, we found 241 in camp. These men presented little or no discharge, had had urethritis, and the urine showed shreds, or was cloudy (not phosphates or carbonates). These men were found without treatment to develop an acute exacerbation following the drill and physical exercises of camp life.

These patients were treated daily except Tuesdays and Sundays. A card for each patient was kept with name, diagnosis and organization. The date and character of the treatment were entered on this card. When the urine became clear, this fact was noted. It was remembered that it takes at least 4 ounces of urine to wash the anterior urethra completely; also if the patient did not fill two glasses, it was not wise to give him credit for a clear urine because the patients soon learn to urinate a few moments before coming for the test, and the urine they do pass is clear. After a patient had five clear urines on five successive days or with a Sunday or Tuesday intervening, he was discharged from treatment, and allowed to have a pass. In the treatment of these chronic urethritis cases potassium permanganate solutions varying from 1:1,000 to 1:3,000 was used or Ultzmann's solution of zinc sulphate, 2 grm.; lead acetate, 2 grm.; phenol, 2 grm., and water, sufficient to make 1,000 c.c.

(To be continued.)

Original Communication.

LICHEN SCROFULOSORUM IN THE SUDAN.

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AND

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CONTENTS.—Introductory—Sudan Case—Pathological History—Etiology—Pathology—Diagnosis—Treatment—Summary—References—Illustrations.

Introductory.—At the commencement of the present era Celsus described two kinds of papular eruptions, the second of which he said the Greeks called "Agrian," while the first he describes in the following terms:—

"Papularum vero duo genera sunt. Alterum, in quo per minimas pustulas cutis exasperatur, et rubet, leviterque roditur; medium habet pauxillo laevius, tarde serpit; idque vitium maxime rotundum incipit, eademque ratione in orbem procedit."

An eruption of papules had previously to this been termed "Lichen" by Hippocrates.

This simple definition became confused and the later Greeks confounded "Sycosis" with Lichen, while Lorry classifies Impetigo and Herpes with Lichen.

In 1808 Willan stated that he considered that it would be a useful distinction to define "Lichen," in conformity with the original sense of the word, as an eruption of papules, and under this heading he grouped Lichen simplex, Lichen pilaris, Lichen circumscriptus, Lichen agrius, Lichen lividus and Lichen tropicus, i.e., the prickly heat eruption of the tropics.

He placed the Lichens in his order Papulæ, and he defined a "Papula" as a very small and acuminate elevation of the cuticle with an inflamed base, not containing fluid nor tending to supuration, while its duration was regarded as uncertain, and its termination was for the most part in scurf.

In Lichen circumscriptus the papules were described as being arranged in clusters or patches and appear on the limbs or trunk. This description is accompanied by an illustration on Plate VI, Fig. 3, of Willan's 1808 work, yet by some peculiar mistake in both Bateman's Synopsis (French edition) and his Atlas (new edition, 1840) it is stated that this species of Lichen was neither figured nor described in the first edition of Dr. Willan's work. It would appear that it was this type of Lichen that Hebra called "*Lichen Scrofulosorum*," because Hilton Fagge in a note to the Sydenham Society's translation of Hebra's works states that some cases which he saw in Professor Hebra's clinic in Vienna were such as would be

styled *Lichen circumscriptus* in England. If anyone doubts this we refer him to Fig. 92 of Gougerot's "*La Dermatologie en Clientele*," published in 1917, and labelled *Lichen scrofulosorum*, and Willan's Plate VI, Fig. 3, published in 1808, and labelled *Lichen circumscriptus*.

Hebra defined his new disease as an eruption of miliary papules, which may be either pale-yellow, brownish-red, or of the same colour as the rest of the skin. They never contain any fluid, and are always placed in groups which sometimes form circles or segments of circles (*vide* our fig. 5) within which may, occasionally, be seen a few pigmented spots, the seats of former papules, covered with a very few minute scales. The papules produce but little itching and remain long unaltered, and are subject to no metamorphoses beyond that of involution with shedding of the epidermis. The affection is, for the most part, confined to the trunk, and it is very rarely seen on the limbs. The course is peculiarly slow, many of the papules appear simultaneously and quickly arrive at their full development and then remain for a long time without change. About 90 per cent. of the patients affected have swollen lymphatic glands or suffer from periostitis, caries or necrosis with or without scrofulous sores, or may have disease of the mesenteric glands. Hebra says that as all these conditions belong to the general state known under the name scrofulosis, he felt justified in applying to the eruption the name *Lichen scrofulosorum*.

There would appear to have been much confusion with regard to the recognition of Hebra's disease, but we have indicated the probable reasons for this, and to-day it is well recognized, especially since 1891, when Jacobi demonstrated the tubercle-like structure of the nodules.

Lichen scrofulosorum was probably first described as occurring in the black skin by Gilchrist in a Negro in the United States in 1899, and though a very able report on the tuberculides was furnished to the fourth International Congress on Dermatology by the late Colcott Fox in 1903, and valuable papers published by Porges in 1903, by Lesseliers in 1907, and by Nobl in 1909, still there is very little literature with regard to this disease in the Tropics. In fact we only know the statement in Castellani's and Chalmers' Manual, on page 1635, that Lichen scrofulosorum, Acne scrofulosorum, Bazin's Erythema induratum, Folliculitis and Acanthosis are observed but rarely in the Tropics.

Chalmers and Martyn have described *Acanthosis* as seen in the Sudan, and now we describe *Lichen scrofulosorum* of which we have met with several examples in the Sudan, selecting as our type a case from Shendi.

Sudan Case.—The case which we are about to describe is that of a Sudanese woman aged about 20 years. She suffers from marked kyphosis, which is the result of old Pott's disease.

There is neither history nor sign of syphilis, while her family history is good, and certainly her mother is in excellent health.

The patient states that the eruption (figs. 1 and 5) from which she suffers has been present as long as she can remember, but that it is not always present as it may disappear for short periods, but, in her experience, it is certain to return. She says that it is always at its worst when she feels in particularly good health.

Her mother says that the eruption began when she was an infant at the breast.

At the time of our examination the rash was present on the trunk, both front and back, and down the arms and legs.

The number of papules was very considerable, but it was not possible to obtain a photograph of the trunk, and the grouping is not well marked on the extremities though shown to a slight extent in fig. 1 and also in fig. 5.

On the upper extremity it was more marked on the arm than on the forearm.

On the lower extremities the spots extended as far as the knee, but on the left side a few could be seen as far as the ankle.

The head, face, hands, and feet were free from the eruption, but a very few spots could be seen on the neck.

The papules show a tendency to be arranged in groups though scattered papules were common on the extremities, so reproducing a picture somewhat like that given in Crocker's Atlas.

The eruption appears to begin as pin-point black collections of scales (fig. 1) at the mouths of the hair follicles.

These scales increase and give rise to a small hyperkeratotic plug, and when this has appeared the surrounding deeper tissue begins to swell and to form a definite papule (figs. 1 and 5) which is slightly darker in tint than the black skin on which it is situate.

The fully developed papule (fig. 1) is more or less circular and the largest may measure one to two millimetres in diameter, though this is quite exceptional as the majority are much smaller (figs. 1 and 5). Indeed many appear to be of pin-point size.

The papule (fig. 1) is raised above the surface of the surrounding skin and is surmounted by a yellowish plug of horny scales, which, however, do not form a spine. In other instances the papule exhibits the depression from which such a plug has fallen.

Some of the papules appeared to us to be somewhat translucent, but on pricking them no fluid exuded.

No obvious pustules were seen, though it will be observed later that at least one miliary or microscopical pustule was present, as it is shown in the histological sections.

As a rule there was no itching, but the patient stated that when a new eruption first appears there is a very slight amount of irritation.

The lesions are said by the patient to slowly die away, and they certainly leave no obvious scars,

nor can any hyperpigmentation be noted in the very black Sudanese skin.

A new eruption comes out quickly.

Remarks.—Clinically the disease appears to be typical of Lichen scrofulosorum although some of the papules are larger than usual, and although the grouping is not as well marked as depicted by Willan, Gougerot and Little, but the appearance on the legs is very like Crocker's illustration, though the grouping is more marked than in that picture.

It is interesting to note that Pott's disease, from which this young woman suffered, has been found by Elliott Smith and Armand Ruffer in the skeleton of an Egyptian mummy dated about 1,000 B.C. (a photograph of this is reproduced in Plate I of Cobbett's "Tuberculosis") and Derry is said to have found a series of specimens dating as far back as 2,000 to 3,000 B.C.

Pathological Histology.—We have studied the histology of this eruption by means of serial sections from a piece of skin removed from the forearm in the neighbourhood of the elbow. Fixation was performed by means of picric acid.

The earliest stage of the papule, which we have observed, is shown in fig. 2, which depicts a hair follicle with its infundibulum or neck filled with horny cells which have accumulated over the mouth of the follicle so as to form the horny plug already mentioned as being visible in the earliest clinical manifestations of the eruption.

It is interesting to note that this supra-follicular keratosis extends only as far as the point at which the sebaceous glands should open, but no such glands are to be seen in fig. 2 or in any of the serial sections on either side thereof.

The root sheaths and the bulb appear to be fairly normal, but the arrector pili muscle seems in this instance to be reduced to small and almost unrecognizable fragments. There is a small amount of cellular infiltration into the perifollicular corium and this appears to be especially marked at the site where the sebaceous glands should be.

The cellular infiltration around vessels in the neighbourhood of the follicles is of the nature of that depicted in fig. 10, which will be described below.

On still further examining the left-hand side of fig. 2 it will be noted that a sweat orifice has been caught in the hyperkeratosis.

Under the horny layer it will be observed that the stratum granulosum is well defined and that the rete and the stratum germinativum appear to be normal.

It will further be observed that in places the subpapillary corium exhibits a certain amount of cellular infiltration, but as this is better seen in other sections it will be referred to later.

Fig. 3 exhibits a slightly further advanced papule. The hyperkeratotic suprafollicular plug is well seen as is the perifollicular infiltration while the absence of the sebaceous glands is again to be remarked, though an arrector pili muscle is in this case "en evidence."

If fig. 3 is examined by means of a reading lens it will be observed that on the right-hand side of the follicle and somewhat in the region where one

might expect to see the mouth of the sebaceous glands there is a well-defined cellular mass apparently containing a giant cell.

This same spot is more clearly shown in fig. 4, taken from another of the series of sections of which fig. 3 depicts one. On examining fig. 4 it will be noted that it depicts a well-defined giant cell around which lies a cell mass composed of plasma cells, lymphocytes and connective tissue corpuscles (epithelial cells), which together with the fibroblast, the slight œdema of the corium, and the attenuation of the connective tissue, reproduce a picture not unlike a commencing tubercle, but no tubercle bacilli could be found in similar giant cells or nodules treated by appropriate methods.

The next step is a considerable extension of the perifollicular infiltration. Fig. 6 depicts a small portion of such an infiltration, which contains *inter alia* a number of giant cells and a minute area of necrosis.

We have no longitudinal section of a completely developed and uncomplicated papule to depict, but fig. 7 shows such a papule complicated by a superficial polymorphonuclear infiltration (which was not recognizable clinically) filling the site where the mouth of the follicle originally lay.

This purulent collection has been observed by Unna, who states:—

"Masses of the horny layer, sometimes soaked with pus, occupy the mouths of the follicles and represent the scale on the top of the spot."

Though we failed after careful search to recognize any of these miliary pustules clinically, still other observers have done so, and Sequeira, writing in Allbutt and Rolleston's "System," on p. 489, says:—

"There may be a central depression to the papule, and there is often a tiny adherent scale or horny plug, or a miliary pustule."

Fig. 7 shows well this superficial horny plug and the underlying miliary pustule, under and on the sides of which the typical tubercular architecture can still be traced, as is shown in fig. 8, which depicts a lateral section of the same follicle as that shown in fig. 7.

With regard to the sections which contain no hair follicle, the epidermis may be quite normal in places, while in others the stratum germinativum, the rete and the stratum granulosum may be reduced to a few cells, while the horny layer is composed of a network of scales, in this way reproducing exactly the thin portions of the epidermis depicted in fig. 3.

In other places the horny layer is more compact and distinctly thickened and here the stratum granulosum is composed of three or four layers of cells, while the rete is distinctly thickened.

As a rule the papillæ are but poorly developed, but in the regions of the thickened epidermis mentioned above they may be broad and conical.

The subpapillary layers of the corium are re-

markably free from cellular infiltration except beneath the thickened epidermis which being near one end of the section may possibly lie close to a follicle. In this region there was considerable cellular infiltration which extends along the vessels for a short distance into the corium.

Fig. 10 shows the dilated vessels and lymph spaces of such an area together with the cellular infiltration which can be seen to be composed of connective tissue cells, plasma cells (and sometimes a very few mast cells), lymphocytes and fibroblasts lying in a mesh work of attenuated connective tissue fibres and showing here and there a cell laden with golden or dark-coloured pigment granules.

Very rarely in this situation one sees a few giant cells as shown in fig. 9.

Apart from the above-mentioned features, the corium is fairly normal and so are the sweat glands, but some few show an excess of connective tissue cells, plasma cells and lymphocytes between the coils.

The hypoderm appears to be quite normal and the deep vessels seem quite normal unless a slight increase in cellular elements in the muscular coats is admitted.

Ætiology.—The evidence of the kyphosis, though old and quiescent, is proof of an old tubercular infection, while the histopathology is also in favour of the papules, being in some way or another due to tuberculousis.

There was, however, no evidence of any active tubercular mischief to be found. The sputum was digested in 3 per cent. caustic potash solution, and then centrifugized and examined microscopically after staining by the Ziehl-Nielsen method, but no tubercle bacilli were seen.

In stained specimens of sections tubercle bacilli were not observed, nor could they be seen in a crushed papule after treatment by 3 per cent. caustic soda and centrifugalization.

Neither were any tubercle bacilli grown on egg media from papules.

Finally a guinea-pig inoculated intraperitoneally with the contents of two papules remained well for six weeks and being then killed failed to show any tubercular lesions.

We therefore conclude that as we failed in all our attempts to demonstrate the presence of tubercle bacilli in the lesions they were most probably absent.

We discussed the advisability of performing von Pirouet's cutaneous reaction and decided not to do so as there is evidence in other observer's experience of the rash being produced or increased by tuberculin, and this would not have been politic in this case.

We therefore concluded that the presence of tubercle bacilli in her body at some time is virtually proved by the evidence of old Pott's disease, but that the present eruption is not due to the tubercle bacillus itself in the lesions, but rather to the action of its toxins.

We must now consider the observations already

made with regard to this disease, which are as follows:—

- (1) *Association with Tubercular Disease.*—Since the days of Hebra there has been a general consensus of opinion that this eruption occurs, as a rule, in persons suffering from some form of tuberculosis. Hebra laid great stress on tubercular disease of the bones and apparently never met with it in cases of phthisis, yet such a case in an adult was shown at the Dermatological Society of London. Crocker found it to be not uncommon in children in whom he suspected a tubercular pleurisy.

Gilchrist's negro patient is said by abstractors to be free from evident tuberculosis (as tested in 1899) and the traces of this disease in the family were of the slightest character.

We have been unable to obtain Gilchrist's original paper, but Crocker (p. 403 of his book) states that there were typical tubercles in the deep part of the skin below the follicles.

- (2) *Histological Character of the Lesions.*—Kaposi, who was the first to examine the lesions histologically, found a perifollicular inflammation characterized by cellular infiltration and exudation with masses of horny cells, sometimes associated with pus at the mouth of the follicles and under the scale on the top of the papule—a condition well shown in our fig. 7.

On studying this cellular infiltration by more modern methods Sack, and later Jacobi, in 1891, found them to consist of round cells, epithelial cells and giant cells, or in other words, the structure of a miliary tubercle.

All these findings were confirmed by Gilchrist in his negro case, and he drew attention also to the numerous polymorphonuclear cells in the inflammatory exudate and sometimes in the epithelium.

A very sharp controversy arose with regard to these findings and as to the criteria which were necessary before a lesion could be definitely affirmed to be tuberculous, and reference may be made to the writings of Neisser, Riehl, Lukasiewicz, Darier, Leredde, Jadassohn, Jackson Clarke and Colcott Fox. Klingmüller disputed the view that there is always a tubercular architecture to be found by histological examination, and stated that he only discovered it to be present in five out of eighteen cases.

Lesselier's careful work in 1907 demonstrated epithelioid round cells and giant cells in groups in fourteen cases out of seventeen, while of the remaining three, one showed grouped epithelioid but no giant cells, the second epithelioid with a single giant cell of indistinct type, and the third merely inflammatory reaction.

This probably corresponds with our findings for in one and the same case we have

found histologically lesions resembling the tubercular architecture and others nearly entirely inflammatory.

We may therefore conclude that, as a rule, the histological features are very suggestive of tuberculosis, but that this architecture may be obscured by inflammatory changes in individual papules or in individual cases.

- (3) *The Presence of the Tubercle Bacillus.*—In 1891 Jacobi stated that once he had succeeded in recognizing a rod, as demonstrated by Gabbet's method, which he considered to be very like a tubercle bacillus, but animal inoculations failed to confirm this conclusion.

Wolf in 1899 also stated that he had found bacilli in the lesions. But many other competent observers have failed, e.g., Riehl, Darier, Lukasiewicz, Jahassohn, &c.

Haushalter in 1898 reported that he had found bacilli in two cases but these observations are ruled out as it is considered that he was dealing with cases of disseminated tuberculosis of the skin and not with *Lichen scrofulosorum*.

We may therefore conclude that the consensus of opinion is against the presence of tubercle bacilli as causative agents in the lesions.

- (4) *Animal Inoculations.*—Only in a few instances have animal inoculations been followed by tuberculous.

Pellizari, however, states that in long persistent cases the eruption may change its form and miliary pustules, such as the one shown in fig. 7, may supplant the original lesions, and it is at this stage that inoculation in Cochons d'Inde give rise to tuberculosis, but in our case inoculations failed to infect a guinea-pig.

Jacobi also succeeded in producing a local mesenteric glandular tuberculosis in animal inoculations from one case.

On the other hand, Leredde, Jadassohn, Hallopeau, Lafitte, and many others, including ourselves, have failed to infect animals.

We may therefore conclude that in the large majority of cases animal inoculations are failures and therefore joining together 3 and 4 of this section of our paper we may deduce the fact that the lesions of *Lichen scrofulosorum* can appear without the tubercle bacillus being present in the lesions.

- (5) *Tubercular Test.*—This section may be subdivided into two, viz:—

- (a) The reaction of the patient to tuberculin tests.

- (b) The production of the eruption by injections or inunctions of tuberculin.

With regard to the reaction of the patient to tuberculin tests, Jadassohn obtained characteristic reaction in fourteen out of sixteen cases, and the same was obtained twice by Neisser. The only advantage of these tests is to show that at some time or another

the patient has been sensitized by the tubercle bacillus which may have entirely departed from his body.

The second point, however, is of greater importance, as Schweninger and Beizzi saw the eruption develop after an injection of tuberculin, and Rona also obtained a similar result.

In Porge's case of lupus, which was being treated daily by injections of 5 milligrammes of new tuberculin, the eruption appeared on the trunk after the fourth injection. It simulated Lichen scrofulosorum clinically, but histologically it only showed inflammation around the blood vessels, hair follicles and sweat glands, and there was no suggestion of a tubercular architecture.

Lesseliers, in Jahassohn's clinic, however, produced in two cases for the first time, by injections of tuberculin, an eruption which was clinically that of Lichen scrofulosorum and histologically showed typical tuberculous structure.

Nohl, using Moro's percutaneous reaction with a 10 per cent. ointment of old tuberculin, produced an eruption in five cases of clinically typical Lichen scrofulosorum. These cases were subjects of tuberculous glands, bones and skin, and when the eruption had almost died away it could always be reproduced by a subcutaneous injection of tuberculin. It was noted that the most conspicuous point of distinction from Lichen scrofulosorum was the tendency of the artificially produced eruption to pustulation, but this is also shown to occur in our fig. 7.

Landousy and Queyrat have produced eruptions similar to Lichen scrofulosorum by the inoculation of virulent cultures of living tubercle bacilli into healthy non-tuberculous animals.

The deduction from these experiments is that the disease can be produced by the tubercular toxin, and the last quoted, if confirmed, tends to show that the toxin and the bacillus mixed can produce the disease in previously healthy animals.

- (6) *Anaphylactic Action*.—Lesseliers showed that in two instances the eruption appeared for the first time in response to an injection of tuberculin and Jadassohn suggested the hypothesis that in these cases there was pre-existent tuberculosis or, in modern words, that the skin cells having been already sensitized by the tuberculin toxin produced the eruption by a typical anaphylactic action when acted upon again after an interval of time by the tuberculin toxin. Further, the anaphylactic action is supported by the experiments of Rist and Rolland in 1914 who showed that the re-inoculation of guinea-pigs with the products of the growth of human and bovine bacilli produce allergic symptoms.

In our opinion this is the true explanation of the etiology of Lichen scrofulosorum, but we have one other possible cause to consider.

- (7) *Paranaphylactic Action*.—In considering the causation of acnitis, Chalmers and Martyn suggested that it was a sort of anaphylactic phenomenon, but differing therefrom in that although the cutaneous cells had been sensitized by the tubercular toxin, yet the activating agent was not this substance but some intestinal toxin of unknown nature which produced the necessary chemical action in the presence of an adjuvant—sunlight. This action differing considerably from an anaphylactic phenomenon we may call "Paranaphylactic Action."

With reference to this action we may mention an experiment performed by Watson Cheyne at the request of the late Colecott Fox. An old woman with quiescent or cured anæsthetic leprosy and a clear skin received an injection of tuberculin after which a macular eruption characteristic of leprosy appeared over the abdomen. Here the cutaneous cells sensitized to the leprotic toxins were activated by tuberculin.

With regard to the adjuvant factor, Grosz and Volk in 1914 have shown that the skin of an animal suffering from tuberculosis is hypersensitive to light and that the skin of normal animals can be rendered hypersensitive to light by injections of killed tubercle bacilli and in one experiment by killed colon bacilli.

These findings, in our opinion, support the views of Chalmers and Martyn with regard to acnitis, and it also helps to explain our views with regard to Pityriasis rubra pilaris and joined to the recent findings of Rivers, if confirmed, of the remarkable frequency of ichthyosis in phthisical subjects makes it possible that sensitization of the skin may be a factor in this disease.

In our ichthyosic case the death-rate from unknown causes of the patient's brother and sisters, if true, was most remarkable in the absence of some family disease.

It appears to us that this possible causation opens up a class of diseases more or less loosely connected with tuberculosis and to which we give the name *Paratuberculides*, but we do not consider that Lichen scrofulosorum belongs to this group, neither do we think that its causation is of the nature suggested above.

Weighing all the evidence available to us in Khartoum we are of the opinion that the causation of Lichen scrofulosorum is an *anaphylactic action* produced by the tuberculin toxin acting upon cells, perhaps those of the sebaceous glands, which had already been sensitized by the same toxin.

Pathology.—Sabouraud has complained that the

histology of cutaneous diseases is written in the most uninteresting manner possible and that some endeavour should be made to point out what the changes really mean.

It is not easy to do this for Lichen scrofulosorum, but the cellular infiltration around the vessels of the corium points to a reaction of the skin against some poison.

It would also appear that the predilection of the disease for the hair follicles must in some way be associated with the disappearance of the sebaceous glands as the effect of the causal poison.

Applying our theory as to the causation to this finding one would suggest that the possible seat of origin of the anaphylotoxin may be these glands and that the products of its instability and breaking up passed out via the neck of the follicle and set up the keratosis.

Diagnosis.—The essential features of Lichen scrofulosorum are:—

- (1) The minute size of the follicular papules which, as a rule, remain purely papular.
 - (2) The sudden appearance of the eruption in which the papules are often in rings or segments of rings.
 - (3) The distribution being mainly on the trunk and usually less on the extremities and not on the head.
 - (4) The association of the eruption with the presence or the history of some tubercular disease.
 - (5) The typical histology of the lesions.
 - (6) The absence of any general ichthyosis.
- The differential diagnosis has to be made as follows:—

From the *Corymbosa syphilide* by the different distribution and by not being arranged in masses of papules around a central larger lesion and in the absence of any history of syphilis and the presence of tubercular disease.

From *Pityriasis rubra pilaris* in the absence of the scaliness on the head, the erythrodermia of the face, the hyperkeratosis and the papules on the first phalanges of the fingers.

From the so-called *papular eczema* by the non-vesiculation and by the absence of itching and by the grouping.

From *Keratosis pilaris* it can be differentiated by the history of tuberculosis and the absence of a certain amount of hyperkeratosis.

From Crocker's *Lichen pilaris* by the absence of the spines and by the smaller size of the papules.

From *Psoriasis punctata* by the absence of itching.

Treatment.—We employed Hebra's classical and apparently very successful treatment, viz., we told her to take half an ounce of cod-liver oil per diem and secondly we told her to rub the oil well into the eruption and to keep it continually in contact therewith and having provided her with a large quantity of cod-liver oil she departed and we saw her no more.

Summary.—We have in this paper recorded the type of Lichen scrofulosorum which we have seen in the Sudan, but we would ask our readers to be careful in the diagnosis as the *Lichen pilaris* of Bazin in the black Sudanese skin is not unlike *Lichen scrofulosorum* and is apparently common in the Sudan.

We consider Lichen scrofulosorum to be a tubercule and to be brought about by anaphylactic action.

The treatment by cod-liver oil is classical, but to be successful the oil must be kept well applied to the lesions as well as taken internally, but whether or no it was successful in our case we do not know. Most probably she never gave the medicine a fair trial.

Khartoum,

May 6, 1918.

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ILLUSTRATIONS.

PLATE I.

FIG. 1.—A somewhat enlarged photograph of a portion of the forearm. Photograph.

FIG. 2.—Hair follicle showing the suprafollicular keratosis, the absence of sebaceous glands and the infiltration in the corium in a very young papule. $\times 50$ diameters. Photomicrograph.

FIG. 3.—Slightly older papule, note the tuberculous-looking nodule on the right of the hair follicle. $\times 50$ diameters. Photomicrograph.

FIG. 4.—Tuberculous-looking nodule of fig. 3 to show giant cells, lymphocytes, plasma cells and connective tissue cells. $\times 1,200$ diameters. Photomicrograph.

PLATE I.



Fig. 1.

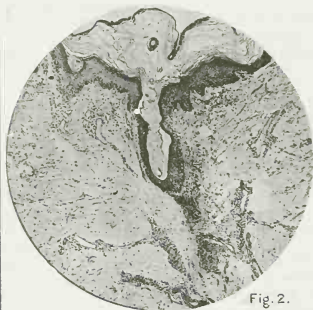


Fig. 2.

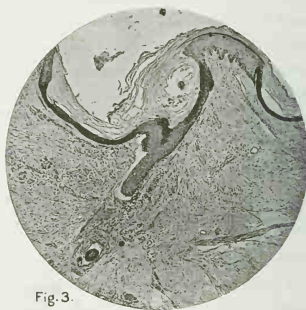


Fig. 3.

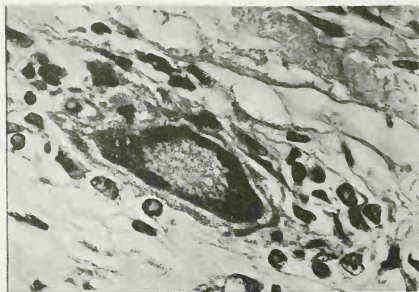


Fig. 4.



Fig. 5.

PLATE II.

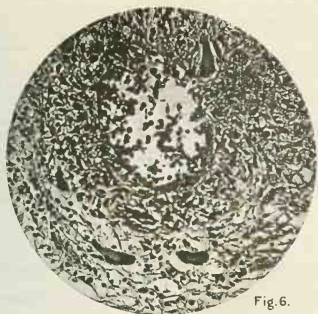


Fig. 6.

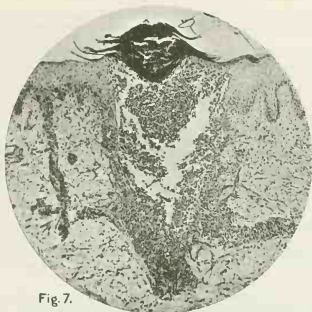


Fig. 7.



Fig. 8.

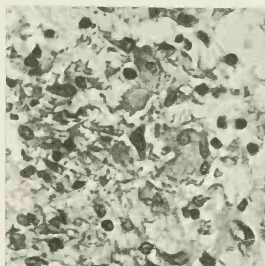


Fig. 9.

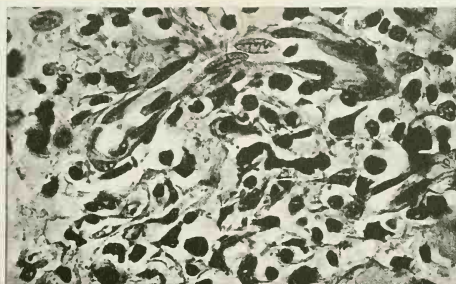


Fig. 10.

FIG. 5.—Leg to show eruption; note the patchy group in places. Reduced. Photograph.

PLATE II.

FIG. 6.—Cellular infiltration in the neighbourhood of a hair follicle. Note the giant cells and necrosis. $\times 150$ diameters. Photomicrograph.

FIG. 7.—Hair follicle destroyed by a secondary purulent infection. Note the cap of horny cells forming the summit of the papule. $\times 50$ diameters. Photomicrograph.

FIG. 8.—Section at the side of a follicle. Note the horny cap and the cellular infiltration into the corium, as well as the presence of a giant cell. $\times 60$ diameters. Photomicrograph.

FIG. 9.—Degenerating giant cells, leucocytes, &c. in the corium. $\times 600$ diameters. Photomicrograph.

FIG. 10.—The cellular infiltration into the subpapillary layer of the corium. Shows dilated vessels, plasma cells, lymphocytes and connective tissue cells. $\times 550$ diameters. Photomicrograph.

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EXAMINATION RESULT (SIXTIETH SESSION, MAY-JULY, 1919).

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Spackman, W. C., Captain, I.M.S.; Dalal, P. A.; Price, A. C.; Stafford, H. N., Captain, R.A.M.C.; Smeall, J. T.; Hoashoo, Miss Y. H.; Finch, Miss S. A.; Bransen, Miss A.; Watch, N. B.; Gilmore, H. C.; Foskett, S.; Scharff, J. W.; Tibbles, J. P.; Warren, Miss E.; Mountain, B.; Jareja, B. B.; Farrell, C.; Neckles, A. R.; Liley, J. A.

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THE JOURNAL OF

Tropical Medicine and Hygiene

AUGUST 15, 1919.

THE WAR AND ITS EFFECTS ON TROPICAL MEDICINE AND HYGIENE.

WAR advances knowledge in the world in many ways. In earlier times it was the chief channel whereby the peoples of the earth got to know each

other. Travelling for other purposes than war was, for the most part, at a discount, there being neither the facilities nor the desire, except in isolated instances, for individuals to visit other lands in pursuit of knowledge. Commercialism may be said to have begun with the introduction of steam, and all the long train of effects which the introduction of steam brought into the world by both sea and land. The long residence of the Israelites in Egypt and Babylon in a state of slave captivity by being brought into intimate contact with the leading powers of the time in both Africa and Asia, and later, when the Greeks and Romans overran their country, they became acquainted with the ways of the greatest of European peoples. Their land was so often invaded that, seeing no security in land, their instincts were directed into commercial dealings and the acquisition of family wealth as the only channel which presented itself to them of maintaining themselves as a people. Alexander and his people spread from the wild and hilly districts of Macedonia to other countries where Nature was kinder and civilization more advanced, and brought to Europe knowledge of the Orient with its ancient store of literature and of art. The crusades gathered the important nations of Europe together and taught them thereby much of each other, and brought into Europe from their Asiatic enemy a widespread acquaintance of other lands and other customs. The dark ages ended with the first crusade—that is, when the knowledge acquired during that campaign and its successors spread throughout the world. In more modern times we can trace advance in medicine and surgery to their war cradles. The Napoleonic wars produced systematic surgery in Britain and France, for it was the experiences of McGregor in the Peninsular War and of the Baron Larrey on many European battlefields that produced the great surgeons of the early Victorian era. The Crimean War gave us modern hygiene through Parke's observations in the Crimea and elsewhere. The visit of Cohnheim to Vienna in 1866, when the Prussian Army in which he was a surgeon was so close to the Austrian capital, that after Sadowa was fought Cohnheim went to Vienna to visit his old friend and teacher Rokitsansky, and found him in his laboratory working at the passage of the red blood corpuscles from the capillaries to the surrounding tissues. On the way back to Berlin Cohnheim, struck by what he heard and saw in Vienna, thought: "If the red corpuscles escape through the capillary walls, why not the white?" and on reaching home he proceeded to investigate the matter, and by establishing the fact that the leucocytes do find their way into the tissues from the blood through the capillary wall gave us modern pathology.

In the Russo-Turkish War of 1878 Reyher, the Russian surgeon, after a visit to Edinburgh to see Lister and his methods, was the first to apply Listerian methods on the battlefield, and demonstrated their applicability in military work. The

War, usually termed "The Great War," has demonstrated how to keep armies in the field free from epidemics, which up to the present have been the most deadly accompaniment of all campaigns of which we have an even approximately accurate history.

The effect of the Great War has been an opening up of several parts of the earth hitherto closed to modern travel and to modern observers in the field of tropical medicine. The Near East, by the visit of Western European armies to the Balkans, Turkey, Asia Minor, Syria and Palestine, has opened the way for observation and work in a fresh field of clinical observation, and a study of epidemics at close quarters—a study denied them in Western Europe where sanitation has well-nigh abolished typhoid, typhus, cholera, tetanus, &c. The campaigns in Africa, both in the South-West and in Eastern Africa, has opened up new countries to the British ken which will require to be dealt with by practitioners specially trained in tropical medicine and hygiene. The rush at the present moment is towards Africa. Fresh banks and merchant firms are being opened up in West Africa. In East Africa it is said that since the war the "better classes" in England are hurrying thither, partly to escape their native land, pestered with silly strikes and infested by corrupt minds, and partly and largely attracted to a "white man's" country where land is cheap and productive, and labour is less difficult to get than "at home." The towns in the East African littoral are increasing in size at a rate which can only be compared to the fables which surrounded cities of mushroom growth in the western parts of the United States in the sixties of last century. Nairobi, for instance, a shabby village of Eastern Africa some fifteen years ago, is now a modern city of some pretensions, with a population approximating some 50,000 people. The Cape to Cairo railway will develop a tract of country prodigious in its possibilities and in its size, and requiring a medical staff numbering not hundreds, but thousands of doctors trained in the treatment of tropical ailments. The people under the care of doctors in tropical countries will far outnumber the white population in the homeland, and British practitioners in these lands will form the larger section of the medical profession in the Empire.

How is the supply of medical men for tropical countries to be met? Their services will be required soon—nay, is in urgent demand now. But the medical schools have for five years been depleted, and the number of graduates must for another five years be far below the average required in pre-war times at home.

Moreover, a further demand will be and is being made for medical officers of health to satisfy the increasing demand of the Ministry of Health. Both these health officers and tropical practitioners require not a five years' course, but rather a six or seven years' course of study to fit them for their special work, so that, although our medical schools

are being crowded with students for the coming winter session, it will be five to seven years before they are qualified for their work, so that a scarcity of doctors is certain during the coming years 1920 to 1924.

The Schools of Tropical Medicine in this country are but twenty years old, and they have been gradually added to and enlarged since they begun their tentative existence. It requires no skilled statesman to see that their even increased size will not meet the requirements of the near future, and it behoves the authorities of these schools to be ready to meet the increasing, the gigantic demands which they must soon be required to meet. The removal of the London School of Tropical Medicine to the centre of London is a wise and an opportune step, but the authorities of the school should look ahead and not cramp their space and development by too hastily deciding on meeting present wants only, for in a few years the space required will be doubled, trebled—ay, even may be multiplied tenfold, if they are to meet the requirements of the Empire. A University of Tropical Medicine and Hygiene will be theirs, and at no distant date, for Imperial wants will grow apace and out of all proportion to anything we have heretofore experienced. The protected native populations of Africa will multiply as they are protected from disease, and these will demand an extended medical staff of proportions beyond any of the past calls upon their teaching and training powers.

We are frequently told to think imperially; if that were true before the war, it is doubly imperative now, for the horizon of work has been extended, and the problem of reconstruction has become more difficult; let us hope it will not be allowed to be insoluble.

Other countries require our help in Africa. The increase in the Portuguese territories will require help from Britain in the matter of the prevention of diseases; in pre-war days the Portuguese were not equal to the heavy burden placed upon them, and it is difficult to see how they can in their crippled post-war state find themselves equal to the task. Still other places not within the British sphere of action must be helped; the Republic of Liberia has neither a public hospital, and but few if any medical men trained in modern medicine. It is useless dealing with the problem of epidemics without the co-operation of all powers interested in the future of Africa. For both men and animals prevention of epidemic disease is essential if Africa as a whole is to be advanced commercially and economically. All the powers must devote themselves to the task; the poorer States must be helped. There is no occasion for despair, for the principles of the prevention of disease are now well understood; it is the practice of these principles that is now required, and this can only be done by organization and by extension of powers to health authorities to enable the practice of these principles to be taken full advantage of.

J. C.

Abstract.

GENITAL DEFECTS AND VENEREAL DISEASES AMONG THE PORTO RICAN DRAFT TROOPS.¹

By H. GOODMAN.

(Continued from p. 152.)

All fluids injected into the urethra were a little above body heat. Glass urethral tips were sterilized by boiling each time used. In giving the irrigations for anterior urethritis, the irrigating can containing the fluid was not more than 2 feet above the level of the penis. The flow of fluid was interrupted so that it was not forced behind the constrictor muscle and so set up a posterior complication.

In only occasional cases did we find posterior urethral involvement. For these we gave retrojections of physiologic sodium chloride solution, 2 per cent. boric acid solutions, or Ultzmann's solution in half or quarter strength.

SYPHILIS.

The syphilitic lesions seen differ in no way from those seen in the United States. Of chancres, we have examined the small papular chancre; the papular necrosive chancre (hunterian), and the erosive chancre. As often before demonstrated, the frenum is a point of lowered resistance to the entry of *Spirocheta pallida*, and at least half our cases presented the initial lesion in this location. A fairly common type of initial lesion is presented by multiple lesions of the prepuce at its free border, a sort of rosette, accompanied by much edema. In one case a lesion within the preputial orifice gave rise to much suppuration. *Spirocheta pallida* was demonstrated in this case, and arsphenamin therapy gave immediate results.

Patients were admitted to the service with the clinical diagnosis of primary syphilis who had passed the primary serologic stage and were in the "silent generalization stage" of syphilis: that is, presented chancre and no secondary lesions of skin or mucous membranes, but in whom the Wassermann test was reported + + + +.

There were eighteen cases of recent secondary syphilis with generalized eruptions. The macular, the maculopapular, and papular ulcerative lesions of the secondary period were all seen. Flat condylomas, mucous patches, and the split papule of the corner of the mouth were observed. In one case the flat condylomas extended along the raphe of the scrotum, along the ventral surface of the penis, and in the senile scrotal sulcus.

Of the blood in 262 cases presenting scars of penile lesions, of healed buboes, or of ulcers of the lower leg or about the knees, 108 had a + + + + Wassermann reaction.

¹ Abstracted from the *Journ. Amer. Med. Assoc.*, March 29, 1919.

Many men examined volunteered the information that certain scars about the lower legs (clinically not syphilitic at all) were the result of syphilitic infection. Blood tests in these cases were negative. In fifty such instances the men were given mercuric salicylate for six weeks in 1-grain doses each week, after which another Wassermann test was taken. The mercury did not provoke a single positive result. Of the numerous skin ulcers coming under notice in Porto Rico, the vast majority have seemed to be due to ordinary pyogenic infections.

Active tertiary lesions of the gumma type are not seen at all. In one case a patient presented serpiginous ulcerating lesions in both palms. The Wassermann test was + + + + and there was ready response to arsphenamin therapy.

We did not expect to find in a selected group of men between 21 and 31 years of age the disfiguring, large, ulcerating lesions of late syphilis with which this island is supposed to abound.

We recognized one case of hereditary syphilis by the saddle nose. There was no history of infection, and the Wassermann reaction was + + + +; but neither teeth, eyes nor ears gave any indication of the syndrome of late hereditary syphilis.

We thought it would be interesting to obtain a syphilitic index, so to speak, of the command. For this purpose we took the blood Wassermann test on all the bakers and cooks. This test served also to determine the fitness of these men for their special duties.

The first series consisted of ten civilian cooks, and four had + + + + Wassermann tests. One other cook had a + Wassermann and a history of syphilis. This series indicated that the infection index of syphilis would be 50 per cent. The next series was 151 enlisted cooks. Of these, twenty-eight, or 18 per cent., gave a total inhibition of complement, and five more gave a + +. Another series of twelve civilian cooks was next tested, and three were positive. The difference of infection can be thought to be due only to the difference in age groups of the civilian and enlisted men. The latter were all under 31 years of age. The bakery unit was formed in camp, and according to regulations, the blood test was done on all its members. Sixty examinations were made, of which 15, or 25 per cent., were + + + or + + + +.

The total number of routine examinations of enlisted men was 211, with forty-three positive, or 20 per cent. The smaller series of civilians was twenty-two, of which six, or 27 per cent., were positive. In neither group do we consider in these summaries the inconclusive results of + or + + Wassermann reactions.

TREATMENT OF SYPHILIS.

The cases treated in camp are limited to the non-infectious cases.

All patients with chancres and with the open lesions of syphilis are transferred to the base hospital. Opportunity for research of an advanced

character is hardly given by a field service, but the safe and approved therapeutic procedures are all used. Arsenobenzol was given not oftener than once in five days, in dilution of 25 c.c. to the decigram, and in dosage of 0.1 grm. to each 30 pounds of body weight, for a course of six injections. Mercuric salicylate in 1- or 1½-grain doses intramuscularly once a week for nine weeks is given concomitantly with the arsphenamin injections. In our own series of cases, to the non-infectious, Wassermann-positive, latent tertiary syphilites we gave courses of mercuric salicylate injections of 1-grain doses for six weeks, rest for four weeks and repetition of the mercury course. A blood Wassermann test was always done at the beginning and close of a course. Patients with recently acquired syphilis, on return from the base hospital, were given courses of arsphenamin. Other patients who had had infectious lesions of syphilis just prior to entering the service were treated with arsphenamin to prevent secondary or recurrent secondary lesions.

There should be no more difficulty in treating syphilis in the field than in any well-regulated outpatient hospital service; in fact, it should be much less difficult because of the control of the men which the army affords. Intravenous therapy is feasible, and with proper preparations of the apparatus, freshly distilled and boiled water, patient without the previous meal, and with the bowels clear, there should be no reactions.

MEASURES FOR THE PREVENTION OF VENEREAL DISEASES.

After three months in camp, during which time the number of enlisted men rose from 250 to 12,000, only nine new cases of venereal disease were acquired.

No passes for enlisted men were issued until the facilities at the venereal infirmary for prophylaxis had been established. The character of the order permitting passes was suggested by the venereal officer at the company commanders' meeting when the matter was brought up for discussion. Puerta de Tierra, a suburb of San Juan, was declared out of bounds for both officers and enlisted men. The sanitary or rather lack of sanitary conditions, the prevalence of all sorts of diseases, the breeding place for every epidemic on the island, it may fitly be called "the place that God never knew." Closing this part of the island has certainly helped to keep down the venereal rate. Passes to San Juan and adjacent towns were limited to daylight except to married men whose families lived in these towns. Passes to more distant parts could be issued for over night. The number of men allowed passes was put at 25 per cent. of the command.

A personal inspection of cities and towns within sixty miles of the camp was made on the first Saturday and Sunday that the men were given freedom, and the conditions were found to be so bad that a campaign to exterminate prostitution

was planned. As a forerunner of the power of the military authorities to close cities to men in uniform, Maniti was declared out of bounds to enlisted men. In this city more than seventy prostitutes were known to the police, and forty-eight were registered at the police office. In the streets on which these women lived, a policeman pointed out to the investigator eight houses with the assurance that he could find pleasure within.

The aid of the attorney-general and the chief of the insular police was enlisted, and by a concentrated movement of both these officials, prostitutes who had formerly all been tolerated, even though known and registered at local police stations, were arrested and sentenced to six months or one year in jail. Heretofore, short sentences of fifteen days or fines had been imposed. This action on the part of the civilian officials took place one week after the pass order was given, so it will be seen that the possibility of infection was immediately reduced. It should be added that the first week of freedom immediately preceded a payday, and the majority of the men were without funds. As the police cleaned up town after town, conditions about the island became much better. A uniform was avoided by the "ladies of light living," and the facilities for prophylaxis were not taken advantage of for good reasons.

Characteristic of all movements for the better, San Juan, the largest city of the island and nearest to the camp, was the most backward in this elimination of evil. The principal papers were actively antagonistic toward the efforts for cleanliness. Editorially and otherwise, adverse criticism was heaped on the crusade to prevent infection among present and future soldiers. The camp surgeon was instrumental in having the order prohibiting enlisted men going to San Juan except on official business. This order came out on the Friday preceding a pay-day and a Labour Day holiday.

Here are a few figures to show the extent of the social evil in San Juan: At the time that inspection and regulation were in vogue, more than 1,500 women were inscribed public prostitutes. At the time the "5 mile" law went into effect, some 600 left the city and its environs for other parts of the island. By June, more than 250 of these had returned to San Juan. During the entire campaign from July to September 17, only forty-two women were arrested, and of these only twenty-six were sentenced. During the two weeks that the city was closed to soldiers, forty-eight women were arrested by the federal authorities who, until that time, had taken no action under the federal law which had already been extended to include a 10 mile zone about cantonments and camps.

Preceding and during all this campaign, efforts to reach the public through the press were initiated. Many articles were published through the medium of the Police Women's Reserve Corps, formed under our immediate supervision. Much credit for awakening the local chapters of the American

Red Cross, the Council of National Defence, and the purely local societies, such as the Ministers' Union, to the pressing need, must be given to Mrs. Edith Hildreth, who publicly sponsored the "Clean up your town" campaign.

Within the camp, education of officers and men was attempted. The cadets of the Third Officers' Training Camp and the officers of each of the three regiments were addressed with particular reference to personal requirements. The prevalence of venereal disease, the danger of illicit intercourse, the "slacker" element of "taking a chance," the true value of medical prophylaxis, the advisability of continence, and its compatibility with perfect health were all given in a talk straight from the shoulder in language that the line officers could understand. The colonel of the regiment was present in each instance and voiced his approval. Material for talks to the men by the officers was also given at these meetings:

Pamphlet 43 of the American Social Hygiene Association* was distributed to the enlisted men in camp who could read, with directions to read it aloud to those of their tentmates who could not read.

The Y.M.C.A. sent a man down from the United States for a short stay, who brought much literature in English. There was little enough circulation of this among a population in camp two-thirds of whom could not read or write in their own language.

A vigilance society of San Juan contributed 3,000 copies of a letter to soldiers that urged continence and appealed to the Porto Rican soldier to uphold the high standards maintained by the United States troops abroad in the matter of venereal disease.

Prophylaxis facilities were available at the venereal infirmary, and an attendant was present on the days and evenings that the men were given passes. The number of prophylactic treatments was unusually low. We are not optimistic enough to lay all the credit to the difficulty in finding prostitutes and the disinclination of the latter to have any relations with the men in uniform, but undoubtedly both these factors were operating. Of course, here as in every place, the men depend on their own devices to prevent infection. We report, in our own short series of early treatments, failure to prevent two cases of urethritis. In one case, the urethritis developed in spite of prophylaxis administered eight and a half hours, and in the second case, ten hours after exposure. Experience shows that after eight hours the prophylactic treatments did not protect.

We are not unmindful to another factor that tended to keep our new venereal cases at a low level, namely, prohibition. This island has been "dry" since March, 1918, and, though a few of

* In Spanish, "Higiene Sexual para los Jovenes," a translation of Dr. W. T. Belfield's "Sexual Hygiene for Young Men."

the private homes have liquor, it is kept for use at rare occasions. The strongest drink is a local beer, which contains only 2.5 per cent. of alcohol. It is sold with a licence.

VENEREAL DISEASES AMONG PROSTITUTES.

What the chances of infection among 12,000 men were, if the prostitutes had been at liberty, may be judged by this brief summary of the venereal diseases found among the latter:—

Of 296 women at the Ponce district jail, one microscopic examination of the discharges from the urethra, cervix and vagina disclosed the Gram-negative diplococcus in 263. Undoubtedly, repeated examinations of the forty-three negative cases will disclose further positive and infectious cases. Of the same 296 women, forty-two had active infectious lesions of syphilis about the genitals. The clinical diagnosis was confirmed in all these cases by a positive Wassermann test. Among 254 women whose blood was taken whether or not they clinically gave evidence of syphilitic disease, 55 per cent. were + + + +.

In a series of Wassermann tests from thirty-six women arrested by the federal authorities in San Juan, nineteen, or more than 52 per cent., were + + + + positive; eight gave an inconclusive reaction, and only seven, or 16 per cent., were negative. Of forty-five women examined from the same source, all except two gave unmistakable clinical evidence of specific urethritis and endocervicitis.

At the district jail of Arecibo, where some 290 women were examined, thirty-two were found to have infectious genital syphilitic lesions. Thirty-one of these thirty-two examined by the Wassermann test gave + + + + positives. The routine blood examination is now in progress. One case of yaws was seen at this institution, and treatment with arsphenamin initiated. More than 250 women at this hospital jail were getting daily vaginal irrigations, although reports on sinears taken had not been reported.

THE VENEREAL INFIRMARY.

Unfortunately, no provision had been made in the construction plans of the camp for a venereal infirmary, and the office was housed for a while in a space 14 ft. by 23 ft. designed for a regimental dental equipment of three chairs. For six weeks, five irrigating cans placed over a makeshift urinal served to treat our urethritis cases. Syphilitic patients were given mercury and arsphenamin on Tuesdays. Space here became too small, the number of patients visiting us disturbed the quiet of the regimental infirmary, and the room was needed by the dentists, so we moved to a latrine, 12 ft. by 17 ft., in which we were able to put up sixteen irrigating cans and use the shower bath portion as an arsphenamin treatment room. Here we treated from 200 to 250 patients each day. A substantial concrete building next became our office.

Reviews.

TRENCH FEVER. By Major W. Byam, R.A.M.C., with an introduction by Lieutenant-General Sir T. H. Goodwin, K.C.B.; a foreword by Major-General Sir David Bruce, K.C.B., F.R.S., A.M.S.; and a summary of the Report of the American Trench Fever Commission by Lieutenant R. H. Vercoe, R.A.M.C. Pp. 196 + xvi and frontispiece. London: Henry Frowde and Hodder and Stoughton. 1919. 10s. 6d. net.

So much excitement has been caused by the subject of trench fever that a book by one of the most active workers on the subject, epitomizing the work of all known authorities, is a distinct boon. The subject is first considered to describe the acute disease, the mode of transmission, immunity, pathology, and distribution of louse-borne diseases. What particularly appeals to readers desirous of obtaining practical information is the description of the chronic disease, prognosis and treatment, and prophylaxis.

Much work still remains to be done, particularly on the parasite causing the disease, considered to belong to the genus *Rickettsia*, also described as occurring in the louse in typhus fever.

PRACTICAL VACCINE TREATMENT FOR THE GENERAL PRACTITIONER. By R. W. Allen, M.A., M.D., B.S. Pp. 308 + xii. London: H. K. Lewis and Co., Ltd. 1919. 7s. 6d. net.

The first word of the title indicates the essential feature of this book. It is strictly limited to practical needs. The arrangement of the book facilitates an understanding of the use of vaccines, the method of taking the specimens, the administration and preparation of the vaccine, so that it may be known when they are ready for administration and the time necessary for their preparation. The chapters, it is gratifying to see, are dealing with Prophylactic or Preventive Inoculation and Vaccine Treatment of "Carriers." These subjects have loomed so extraordinarily important in the war that it is only natural that there will be greater faith in them and of their use in civil life. The author fully deals with therapeutic immunization, the method of dealing with systemic diseases of respiration, circulation of the skin, connective tissues, bones and joints, digestive and genito-urinary, eye, followed by diseases of the ductless glands. With the help of a copious index any disease can be readily understood with the least possible expenditure of time and energy. There is an admirable chapter consisting of practical questions and answers which have come before the author in the course of his work. In a sentence the work is in accordance with the recent conception of disease, as being due to the causative bacteria, and vaccine treatment, combined with clinical experience of the symptoms caused by the parts affected, is no doubt the medicine of the future.

Original Communications.

"BOOMERANG" LEG.

By J. BURTON CLELAND, M.D.

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New South Wales.*

"BOOMERANG" leg was apparently first described as a clinical entity by the late Professor Sir E. C. Stirling, F.R.S., of Adelaide, in an article entitled "Notes from Central Australia," published in the *Inter-Colonial Quarterly Journal of Medicine and Surgery*, vol. i, 1894-5, p. 221—an Australian medical journal, which, after issuing two annual volumes, was amalgamated with the *Australian Medical Journal* to form the *Inter-Colonial Medical Journal of Australasia*. As this publication is difficult to consult, it seems worth while quoting in full Professor Stirling's description of the disease. His personal acquaintance with "Boomerang" leg took place during the course of the Horn Exploring Expedition on the overland journey between Adelaide and Port Darwin. Dr. William Gardner, of Melbourne, writing in Volume II of this same journal, page 47, under the heading of "Platynemism," refers to Professor Stirling's paper, and adds that Professor Watson, of the Adelaide University, had long known of the existence of "Boomerang" leg amongst the natives of Central Australia, and had since made the retrospective diagnosis of platynemic or sabre-like tibiae, like those of the prehistoric or cave men, with the addition of a forward curve.

In Castellani and Chalmers' "Manual of Tropical Medicine," 2nd edition, page 1447, "Boomerang" leg is described under this name from a private communication made by Dr. Ernest Black in 1913. I am inclined to think that it is probable that Dr. Black was referring to Professor Stirling's description of the disease.

Breiln and Priestley contribute a note on "Boomerang" Leg to the *JOURNAL OF TROPICAL MEDICINE AND HYGIENE*, 1915, page 217, attributing the first description of the disease to Dr. Black.

J. B. Christopherson contributed an article, entitled "Osteomalacia Sclerotica—'Boomerang' Bones, Corkscrew Bones—the so-called 'Boomerang' Leg; Sclerosing Panosteitis of the Long Bones preceded by Softening and Plasticity, and resulting in considerable deformity," to the *Proceedings of the Royal Society of Medicine*, Vol. XI, No. 8, June, 1918, Section of Pathology, page 35. He erroneously refers the first description of "Boomerang" leg to Dr. Ernest Black. From a comparison of his photographs with the drawing reproduced by Sir E. C. Stirling and the photographs given by Breiln and Priestley, I think there is little doubt that the case described by Dr. Christopherson is not one of the same disease as the Australian "Boomerang" leg.

Professor Stirling's original description of the disease is as follows:—

"CURVATURE OF TIBIÆ."

On the journey northwards of the Horn Expedition, I noticed a young native girl of about 15 years of age, whose tibia presented a conspicuous and symmetrical anterior curvature. This was associated with marked platynemism, a condition in which the tibiae are much flattened, as if by lateral compression. This girl was ill-nourished even to emaciation, but presented no other abnormalities either of bones or teeth so far as I could discover. Subsequently, when, in the neighbourhood of the Macdonell Ranges, we came into more frequent contact with the natives, I was surprised to find that a very large number of the blacks, both male and female, young and adult, presented the same peculiar tibial conformation as the only observable abnormality, the platynemism being also well marked. The latter peculiarity has received attention from an ethnological point of view, though it is not confined to the Australian aborigines. It has also been noticed in the tibiae of paleolithic man. Its significance is unknown, but it has been suggested that it may have reference to the free movements of the muscles of the leg in people whose feet have not been subject to the confinement of boots or shoes. Probably the estimate of the degree of platynemism observable in the cases alluded to is exaggerated by the extreme prominence and sharpness given to the anterior edge of the tibia by the curvature. So far, I have not had an opportunity of observing the bones themselves. Except in the first case seen at Crown Point, where general malnutrition was a marked feature, I was unable to notice any associated pathological conditions, and the possessors of the curved tibiae were just as well nourished as their unaffected fellows.

"On my return I examined all the available native skeletons, but, though the flattening was usually marked, there was no appreciable curvature, and I do not remember ever having noticed the peculiarity in the more southerly tribes, or on the Northern Territory coasts.

"The question is—To what extent is this to be regarded as a racial characteristic or a pathological condition? It certainly has no resemblance to the ordinary curvatures of rickets, and no other associated rachitic condition could be noticed. As an ethnological character, platynemism has been treated of by various writers, but from a pathological point of view, the only reference, bearing on the subject, that I can find in the literature at my disposal is by Topinard, who states in his 'Anthropology,' that 'in 200 Parisian tibiae collected from the St-Marcel and St-Germain-des-Pres cemeteries, dating from the fourth to the tenth centuries, 5.25 per cent. were platynemic, and 14 per cent. were bent. The latter peculiarity is not uncommon in old graves. But he does not mention the direction of the curvature, associated with platynemism, and prominent anterior border, as one of the forms of a rachitic condition affecting the tibia, and he figures a section of such a bone which cer-

tainly differs from the usual section of an ordinary platycnemid tibia. Professor Watson informs me that he has observed a similar anterior curvature in the natives of Mallicolo.

"I shall be glad if this note should call forth any similar observations from other parts of this country or elsewhere, that the point may be determined.

"In the accompanying illustration of the leg of a young adult woman at Charlotte Waters, the feature is well marked, though not to such an extreme degree as in the girl at Crown Point—the latter, however, was absent from the station on my return journey, so that I was unable to get a sketch or photograph. The condition is well recognized by the residents who, not inaptly, describe the natives so affected as 'boomerang-legged.'"

HELMINTHIC OVA IN HUMAN STOOLS.

Expeditionary Force, Sinai Peninsula, 1916-1917.

By P. W. O'CONNOR, M.R.C.S., L.R.C.P., D.T.M. & H. (Camb.).
London School of Tropical Medicine.

THE work described in this paper was carried out at Kantara, Romani and Mazar, in conjunction with examinations for the detection of human protozoa in stools.¹

The cases examined may be considered under three headings.

I.—White Troops.

II.—Indian Native Troops.

III.—Egyptian Native Labourers. (a) Suffering from diarrhoeal conditions. (b) Healthy men (so-called).

METHODS OF EXAMINATION.

I had neither time nor facilities for preparing specimens for examination by Bass's method. As an alternative, three fairly thin coverslip films were made with saline from a specimen of each case on every occasion on which the patient's stool was examined. These were carefully searched with the $\frac{3}{8}$ in. and the third slide was also studied with the $\frac{1}{8}$ in. obj. When an ovum was discovered with the $\frac{3}{8}$ in., diagnosis was confirmed with the $\frac{1}{8}$ in. and $\frac{1}{16}$ in. obj. I adopted this method after examining from one to six films from a number of cases. Ova not found in the first film were frequently discovered in the second, less frequently in the third, and in fifty cases where four slides were examined an ovum was only found on two occasions, in the last slide, which had not been observed in the first three.

I.—WHITE TROOPS.

All the soldiers were suffering from diarrhoeal conditions on admission to hospital. Stools from each were examined on several occasions; in no case less than twice and in many on from three to

six different days. In consequence faecal material of varying consistency was examined from each patient.

Two thousand and eighty-two cases were examined, and the results are shown in the accompanying table.

The two *Heterophyes heterophyes* cases had only been in Egypt for a short time, and had never served abroad before arriving in that country. One of these cases complained of abdominal discomfort, nausea some time after food, and tenderness below the right costal margin. These symptoms disappeared, after treatment with filix mas, which resulted in the passage of a number of flukes.

The *Tenia saginata* case also complained of similar symptoms and increase in appetite. Following passage of the worm with its head, after treatment, the symptoms disappeared.

No rectal schistosomiasis was observed throughout the examinations. *Schistosoma hematobium* was, on the other hand, seen fairly frequently during a large number of urinary examinations from different units of British soldiers.

II.—INDIAN NATIVE TROOPS.

All the ninety-nine cases examined were admitted to hospital for diarrhoeal conditions; each was examined on several occasions. Some of the patients, as in many of the Egyptian cases which follow, had multiple helminthic infections. Fourteen cases were found to be infected out of the total examined. In this series clinical symptoms were most marked amongst the patients with ankylostomiasis. The debility amongst these was more extreme than was seen amongst the same kind of cases amongst the Egyptians.

TABLE SHOWING NUMBER OF CASES EXAMINED AND INFECTED IN EACH SERIES, AND THE NUMBER FOUND INFECTED BY THE DIFFERENT HELMINTHS.

	White troops	Indian native troops	Egyptian natives, patients	Egyptian natives, healthy
Cases examined	2,082	99	667	1,006
Cases infected	14	14	403	812
<i>Ankylostomum</i> ova	1	9	370	690
<i>Ascaris lumbricoides</i> ova ...	0	5	115	275
<i>Tricoccephalus trichiuris</i> ova ...	9	1	8	18
<i>Oxyuris vermicularis</i> ova and adults	0	1	8	17
<i>Strongyloides stercoralis</i> (embryos)	0	0	9	13
<i>Tenia saginata</i> ova	1	0	6	18
<i>Hymenolepis nana</i> ...	1	1	4	22
<i>Heterophyes heterophyes</i> ...	2	0	12	21
<i>Schistosoma mansoni</i> ...	0	0	58	22
<i>S. hematobium</i> ...	0	0	32	22

III.—EGYPTIAN NATIVE LABOURERS.

The cases belonged either to the Egyptian Labour Corps or to the Egyptian Camel Transport, and had been recruited from the towns and villages in Upper, Central and Lower Egypt. All parts of Egypt were fairly well represented in the series. A few cases came from the Anglo-Egyptian Sudan.

¹ Parasitology, vol. xi, No. 3, 1919.

(a) Cases suffering from diarrhoeal conditions.—667 were examined on two or three occasions; 403 were found to be infected. Many of these had multiple helminthic infections. The low figure in positive findings is probably attributable in part to dilution of the intestinal contents with blood and mucus and to frequent evacuations.

Clinically, the worst cases in this series were due to schistosomiasis. In addition to these, a considerable number of blood and mucus stools were sent for confirmation of *Schistosoma* diagnosis, in which the condition turned out to be due to amoebic or bacillary dysentery.

Amongst the *Schistosoma* cases there were six double infections of *S. mansoni* and *S. hæmatobium*.

One double infection of *S. mansoni* and *S. hæmatobium* was found co-existing with a heavy infection of *Entamoeba histolytica*; many of the latter parasites contained numerous red blood cells.

One infection of *S. mansoni* was associated with a similar acute infection of *E. histolytica*.

One case of double infection with *S. mansoni* and *S. hæmatobium* was found on bacteriological examination to be infected with the Flexner Y bacillus.

One *S. mansoni* infection was associated with infection by the bacillus of Shiga.

In one *S. mansoni* infection Morgan's No. 1 bacillus was isolated.

During the examinations I noticed that infections with *S. hæmatobium* were much more frequently accompanied by the passage, per rectum, of pure blood or blood clot than was the case in *S. mansoni* infections. Fresh blood or clot was seen in thirteen cases of *S. hæmatobium*, and only once with *S. mansoni*.

(b) The so-called "healthy" Egyptian labourers had not been admitted to hospital, and were performing their ordinary work; the examinations were made while I was investigating the number of *E. histolytica* carriers amongst them. Each case was only examined on one occasion, when three films from a specimen were prepared and studied, as described. 1,006 cases were examined, and helminthic ova were found in the stools of 812. Most of the stools were formed and showed little or no macroscopic evidence of disease.

In cases of *Hymenolepis nana* and *Heterophyes heterophyes* infection, ova were frequently found in masses within small areas on a slide, suggesting mutilation of a proglottis in the first case, and of the fluke in the second during passage *per rectum*.

Amongst the *Schistosoma* infections, *S. mansoni* and *S. hæmatobium* were twice found in the same case; in one of these there was an enormous preponderance of *S. hæmatobium* ova.

The stools of the *Schistosoma* cases were brown, formed, or unformed, except in six cases, and in the majority the patients gave no history of symptoms which could be attributed to the parasites.

In one of the double infections above mentioned

there was a large infection of actively motile *E. histolytica* as well. Free *E. histolytica* were also found in one case of *S. mansoni*.

During the examinations the number of *Schistosoma* ova passed seemed to bear no relation to the morbid appearances of the stools or the clinical manifestations of disease. Frequently large numbers of *Schistosoma* ova were passed in apparently normal stools by men who complained of little or no disability. In other cases with dysenteric conditions, obviously due to the presence of the fluke and its ova, the latter were comparatively scanty. The number of cases in which *Schistosoma* ova were present without symptoms was very much greater than the number in which symptoms were complained of. Clinically, the most severe dysenteric cases due to *Schistosoma* were associated with the presence of *S. hæmatobium*.

I did not systematically examine the urines of patients for *Schistosoma*. On one occasion I examined 200 men from one regiment from which a number of cases of the disease had been reported. These men had all been carefully questioned as to past history, and none of them complained of any symptoms whatever. Nevertheless, I found the ova of *S. hæmatobium* in fair numbers in four different urines examined. Within four months the four patients began to complain of symptoms. As for some months they had no symptoms while passing ova, it would seem that some other agency is necessary besides the mere mechanical effect of the *Schistosoma* ova for the production of symptoms of schistosomiasis, and that the agency is probably due to some local specific infection.

Treatment of Yaws (L. E. Guerrero, E. Domingo and M. Argüelles, "Further Observations on the Treatment of Yaws with Castellani's Mixture." *Philippine Journal of Science*, 1918, vol. xiii, No. 4, Sect. B, "Tropical Medicine").—The authors give the result they have had in the treatment of yaws, using Castellani's mixture, which consists of:—

Tartar emetic ...	...	gr. i
Sodii salic. ...	...	gr. x
Potassium iodide ...	...	5 i
Sodium bicarbonate ...	...	gr. xv
Water ...	...	ad 5 i

One dose (5i) diluted in four ounces of water is given three times daily to adults, half doses to children 8 to 14 years of age, one-third doses or less to younger children. The mixture as noted by Castellani is cloudy, and has a sediment due to the formation of antimony oxide. The sediment, however, disappears on diluting with water, or the mixture may be made permanently clear by adding to it $\frac{1}{2}$ dr. of glycerine per ounce. The authors come to the conclusion that the diverse manifestations of yaws heal under the influence of this treatment, and that the cure of recent infections by this preparation is "nearly as marvellous as that by salvarsan and neosalvarsan."

Notices.

BUSINESS AND GENERAL.

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THE JOURNAL OF

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SEPTEMBER 1, 1919.

HOSPITAL SHIPS IN TIME OF PEACE.

ONE of the first considerations in time of war is to provide transport by land and sea for the sick and wounded. Hospital ships were a feature of the Great War which received much attention on the part of the authorities, and on the whole they gave the wounded and the sick as comfortable

transport as the exigencies of war allowed. It must be remembered that the system of transport by sea was improvised when war began; the ships were hired as they could be spared from various sources, and the fittings had to be modified according to the design of the ship.

Hospital ship accommodation is included and figured in the R.A.M.C. training and text-books, and the principles are laid down in fairly exact form.

It will, however, be noted that hospital ships and means of transport differ as they are set forth and used by the Navy and by the Army. The swinging cot is characteristic of the naval accommodation as distinct from the bunk or stretcher measures used by the Army; so that even the designs of British hospital ships vary in essential principles, and were we to go further afield we would find that other nations adopt other plans. Still in war we have a special service for the transport of the wounded by sea which, as time and experience gather, will gradually attain, if not perfection, at any rate improvement in methods.

In both war and civil life we have an ambulance or transport service devised to transport the sick and wounded by land, but in times of peace the sick have no special provision made for them whereby they can be conveyed by sea. This is brought home to anyone who has travelled to our colonies or to distant parts of the Empire, and by either witnessing what the sick on board ship have to put up with, or if one has undergone the ordeal, he will remember as long as he lives the suffering entailed when he travelled, say from India or China, as an invalid.

A sick man is not welcomed on board ship by anyone. However kind the captain and officers may be, they dread to know that a man or woman seriously ill is to travel by their ship. The passengers also resent his (or her) presence, and consider that "anyone as sick as this person seems to be should never have been allowed to travel." Moreover, "how do we know that the disease from which he is suffering is not infectious?" is a further reason for resentment. The doctor on board the liner, who may be and generally is totally unacquainted with tropical ailments, although he enters no actual protest against a sick passenger who is being carried on board, feels keenly that he has insufficient appliances, drugs, or means of treatment for a case of this kind. The patient himself knows that he must be a nuisance to everyone, and this adds to the depression which the anticipation of a long voyage under trying circumstances means. The steward's staff feel that additional work will be theirs, and the stewardess knows that she will have her hands full by this person, who, being ill, is often rendered peevish, exacting and trying from the very fact of being ill. The well-equipped liners have, or had before the war, a trained nurse on board, but the sick person would require a nurse to himself, or even a night and day nurse were he at home. This is, however, an impossibility at sea, and there may be others

on board requiring a nurse's attention. The natural answer is that a patient in such a condition should not be allowed to travel; but it may be a case for which it is imperative that change to a temperate climate be obtained at once, so he is either to be left to die on shore or suffer neglect on the voyage.

Without further delineating of the miseries and the drawbacks to be encountered, let us consider what is to be done. One way is to have on board our liners a sick bay for patients, to which a nurse or nurses are attached and fitting appliances and a suitable dietary, &c., are to hand. This means a modification in the construction of the ship, a step which so far does not obtain in any ship we know of, and one which it is not likely we shall ever see in our day.

Are these cases numerous? Let anyone who knows something of the many cases of invaliding from, say, India in the course of a year, especially in spring or autumn, answer; and if we put them down as many hundreds we are not stating the numbers too highly. Would it pay to have a hospital ship, such as we have been made familiar with during war, devoted to the well-being of such cases? We have not the least hesitation in saying that it would pay. Pay not only from a monetary point of view, but pay also from a humanitarian point of view a thousand times over. Many men, women and children are kept in the tropics longer than they ought to be owing to the impossibility of getting a passage, and because all know that a sick person travelling by sea may succumb on the voyage owing to the impossibility of the want of attention and proper treatment.

Many hospital ships must be available for such a purpose in our ports that are not yet dismantled, and we would request the authorities not to dismantle them until this question of the transport of the sick from distant parts of the Empire be duly considered. It is, after all, an imperial question, and one which the Navy could be entrusted with, to the benefit of the sick and suffering, and in the interests of the Empire.

J. C.

PAINLESS CHILDBIRTH IN TWILIGHT SLEEP IN THE EAST. By Cecil Webb-Johnson, M.B. Foreword by Captain V. B. Green-Armytage, I.M.S. Pp. 123. Calcutta and London. Butterworth and Co. 1918. Rs. 4 net.

This work serves many useful purposes both to the laity—male as well as female—and to doctors. The importance of care before as well as during confinement, with the details of the necessary precautions for this event, so important to individuals as well as to the State, is clearly explained. The most important feature of the book are the details connected with anæsthetics and drugs during confinement, which, except in rare cases, demand the attention of special attendants, i.e., a doctor who is able to devote considerable time to each case, as well as special nurses.

Abstracts.

THE PRIMARY TOXIC EFFECT OF NEO-SALVARSAN.¹

By Professor K. PETRÉN.

University of Lund, Sweden.

It has been difficult from clinical observations to decide the question, what toxic effects salvarsan produces. A very great number of observations have been published in which morbid symptoms have occurred after the injection of salvarsan; these symptoms have often been of a very serious character. The symptoms which have been observed as a consequence of the injection of salvarsan have been very various in the different cases; they all are localized to the nervous system, but otherwise they are described as very different.

A "TOXIC STORM."

As regards the causes of the morbid symptoms from the nervous system after injection of salvarsan, one must always take into consideration the possibility that they may be a consequence of the biological interaction between the human organism and the micro-organisms of syphilis—as the experience of the effects of salvarsan has almost exclusively been obtained from observations of patients suffering from syphilis. Many authors have accepted the suggestion that these symptoms from the nervous system, to a very great extent, are due to a "toxic storm"—that is to say, that they suppose a very great number of the micro-organisms of syphilis have been suddenly killed through the effects of salvarsan, which has resulted in a large amount of toxin suddenly becoming free in the blood.

The grounds which speak for such an interpretation of the salvarsan poisoning are, indeed, very strong. As a consequence, we can never come to very definite conclusions as to what are the real toxic effects of salvarsan itself, so long as our experience is confined to patients suffering from syphilis.

NEOSALVARSAN IN INFLUENZA-PNEUMONIA.

During the great epidemic of influenza last year I have had the opportunity of observing the effects of the injection of salvarsan in individuals not suffering from syphilis, as I have tried to treat the influenza-pneumonia with neosalvarsan. In this paper I shall not enter upon the question as to the effects of this treatment on the pneumonia itself. (I hope that I shall find occasion shortly in another medical paper in the English language to treat of this question among a number of others relating to my experience of influenza-pneumonia.) Here I will only speak of the toxic effect which I have observed as a consequence of the injection of (neo) salvarsan.

¹ Abstracted from the *Lancet*, August 9, 1919.

In a great number of cases of influenza-pneumonia (140) we have given injections of neo-salvarsan. In almost every case we injected 0.60 gr. (in my first cases only we tried a smaller dose), but having seen no harmful effect follow these smaller doses we had at once progressed to the dose of 0.60, and thereafter regularly continued with the large doses.

In by far the greater number of cases we have not seen any toxic effect whatever. In some few cases the injection has been followed by vomiting, a special effect of the injection. In some of these cases the vomiting occurred only once; in other cases two or three times, or perhaps sometimes even oftener. This pathological occurrence has quite regularly shown the following characters. The vomiting has appeared during the first twenty-four hours following the injection—only during this period and never later. The patients have not shown any other signs of dyspeptic troubles. After the lapse of twenty-four hours no disturbance of the stomach has occurred. Practically all the patients suffering from influenza-pneumonia—and I lay special stress upon this—have been treated with digitalis, either with drug or with digitotal (a preparation which approximately corresponds to digalen). When I first saw these cases of vomiting I did not venture to give them digitalis for the next few days, but after having found that the patients to whom I had given digitalis after two or three days tolerated it with no more difficulty than other patients, I began later to give even these patients digitalis in the cases with vomiting, when the first day had passed, in other cases also during the first twenty-four hours after the injection.

Vomiting after the injection of salvarsan we have seen in a great number of cases of pneumonia among women. For a time I did not observe the occurrence among men, but later I saw it in four cases of men; for three of these cases the body weight was determined 53 kg. (19 years), 53.5 kg. (28 years), and 57 kg. (17 years); the fourth patient was a man of 24 years and was not a person of great weight. Otherwise we have not seen the least toxic trouble after the injection of neo-salvarsan. We have never seen albuminuria when the patients had not shown it before the injection, and in those cases where they had albuminuria before the injection we have never observed that it had increased as a consequence of the injection. Also the microscopical examination of the urine has never shown an increase of the sediment as a consequence of the injection. We have never seen headache, vertigo, or other symptoms from the nervous system—with exception of the vomiting—after the injection.

CONCLUSIONS.

From the foregoing description we find that the toxic effect after the injection of salvarsan was quite mono-symptomatic, and that the only toxic effect, when it occurred at all, followed fixed laws, as its occurrence was limited to a fixed period after

the injection, and was also to a certain degree dependent on the weight of the individual that had received the injection.

When we take these circumstances into consideration it seems unnecessary to discuss the question where the salvarsan exercises its effects, as it is quite manifest that a morbid phenomenon of this regular character and of this short duration (with no exception from the rule that the vomiting occurs *only* during the first twenty-four hours after the injection) cannot be the consequence of a local effect exercised on the stomach wall, but must be *the effect of the poison on the centre of vomiting in the bulb.*

As my observations on the effect of the injection of salvarsan are uncomplicated, in the sense that they are free from the disturbing influence of the biological effect exercised by salvarsan on the micro-organism of syphilis, and thanks to the fact that these observations are of sufficient number to lead to the deduction that the phenomena produced are governed by certain laws, we come to the conclusion that the first toxic effect of salvarsan (neo-salvarsan) on man can be demonstrated with the certainty of an experiment on animals, and that this toxic effect consists in a strictly elective effect produced exclusively on the centre of vomiting in the medulla oblongata.

INTRAVENOUS INJECTIONS OF ANTI-MONIUM TARTARATUM (TARTAR EMETIC) IN BILHARZIASIS.¹

By FRANK E. TAYLOR, M.D., M.Sc., F.R.C.S., D.P.H.

FAIRLEY's² work demonstrated how bilharzial parasites and their ova exert a deleterious influence on the tissues of their *definitive* host, man, mainly by the production of toxins, and not merely mechanically. These toxins call into action cellulohumeral responses which neutralize or limit their activity. As a result immune bodies, including complement-fixing substances, are produced, and a complement-fixation test for bilharziasis has been devised by Fairley comparable to the Wassermann test for syphilis. As antigen an alcoholic extract of the infected livers of snails (*P. boissyi*) was employed. Positive complement-fixation was obtained in a high percentage of cases in man as well as in experimentally infected monkeys. The practical application of this test, Fairley considers, will facilitate the diagnosis of bilharziasis in the early stages of the disease before localizing symptoms have developed, and also in estimating the effect of the intravenous administration of drugs on the adult parasites.

¹ Abstracted from the *Lancet*, August 9, 1919.

² Fairley: "The Discovery of a Specific Complement-Fixation Test for Bilharziasis and its Practical Application to Clinical Medicine," *Journal of the Royal Army Medical Corps*, June, 1919, 449, the *Lancet*, 1919, i, 1016.

Ten cases of vesical bilharziasis have recently been treated at the Bermondsey Military Hospital.

The solutions used were made by dissolving the tartar emetic in freshly distilled sterile water, 1 gr. in 6 c.cm., and then sterilized by autoclaving for one hour. At first the injections were administered every two days, with a maximum dose of 2 gr. Later cases had 3 gr. twice a week. No serious drawback, no marked toxic manifestations, and no severe reactions had followed the injections. With one exception all the patients were troubled with irritation of the pharynx and a spasmodic outburst of coughing either during or after the injections, usually just at the end of administration. In four cases stiffness and cramp of the muscles of the neck and shoulder girdle were complained of. Gastro-intestinal symptoms were fairly frequent, comprising nausea in three cases, vomiting (usually once only) in four cases, and slight diarrhoea in three cases. Headache was noted in two cases. There was induration at the seat of injection in two cases. Pyrexia (to 103° F.), slight giddiness, pains in the body, general pruritus, and loss of weight were noticed in one case each.

The immediate results were very striking and comprised a rapid disappearance of the blood and ova from the urine, disappearance or mitigation of the hypogastric and perineal pains and pain in micturition, improvement in anemia, gain of weight, and a quite striking improvement in general appearance and feeling of well-being. As far as is known all these cases have remained free from symptoms except one, who developed a smart hæmaturia within a week of completing the course of injections; no ova could be discovered on microscopic examination of his urine.

Case 3 was so pleased that he writes from the country under date December 22, 1918:—

"The hæmorrhage has completely stopped, and bar a little pain in the affected region I am practically fit" (although he states elsewhere his duties are not of a very light character). "There are one or two fellows here who are discharged with bilharzia and have had no treatment whatever. They are naturally anxious to undergo this particular treatment. I should be greatly obliged if you could inform me as to the course they should adopt to obtain it."

That tartar emetic injected intravenously exerts a strikingly beneficial effect on vesical bilharziasis is amply demonstrated by the cases here recorded, but how this effect is produced is not so evident. That the drug kills or inhibits the activity of the parasite appears the most reasonable suggestion. At what stage in the life-history of the parasite this occurs, whether ovum, miracidium, or adult worm, or all three, has not yet been demonstrated.

THE TOXICITY OF TARTAR EMETIC.

The high toxicity of tartar emetic has always been a matter of serious concern to those employing it in intravenous injections, especially in the intensive

manner now prevailing for the treatment of bilharziasis, trypanosomiasis, and leishmaniasis. That such injections are not free from risk is shown by Knowles¹ and by Archibald and Innes.² The former recorded five deaths out of twenty cases of kala-azar treated by tartar emetic, whilst the latter record a fatal case of bilharzia so treated.

The case of Archibald and Innes was a strong Egyptian soldier suffering from hæmaturia, whose urine showed a heavy infection with terminal-spined ova of bilharzia. The solution employed for intravenous injection contained 1 gr. of the drug dissolved in 2 c.cm. of sterile water, being mixed immediately before use with an equal amount of sterile normal saline solution. The initial dose was $\frac{1}{2}$ gr., gradually increasing to a maximum of 2 gr., until a total of 33 gr. were given, the injections being given every second day. At the end of the treatment the urine contained blood, but no ova. The patient then developed influenza, and died on the fourth day of the illness from bronchopneumonia. At the autopsy no adult worms could be found, though the congested mucous membrane of the bladder contained large numbers of bilharzial ova. The liver and kidney cells and the tunica intima of the inferior vena cava showed fatty degeneration and fatty infiltration, changes which were attributed to the action of tartar emetic, and were not sequels of bilharzia, influenza, or a previous malarial infection.

This opinion of Archibald and Innes appears correct, as somewhat similar changes are found in the liver in certain toxic conditions, especially in the closely allied conditions of arsenic and phosphorus poisoning, and as was found in trinitrotoluol poisoning. The toxins attributed to the ova and miracidia of bilharzia by two Japanese observers, Kiyono and Murakami, do not appear to produce fatty changes in the liver, but lead to a cirrhotic condition of that organ.

Although in Archibald and Innes's case the cause of death appears to have been influenzal bronchopneumonia the degenerative changes in the liver and kidneys may have been recoverable, or may have been due to undue susceptibility of the patient to antimony. That very much larger doses of tartar emetic can be given intravenously with perfect safety is evident by a case under the care of Dr. C. W. Daniels, treated by Dr. H. B. Newham, C.M.G., of a patient infected with *Trypanosoma rhodesiense*, who received 236 bi-weekly intravenous injections of tartar emetic in the course of two and a half years. The maximum dose was 2½ gr., and the total quantity administered amounted to the enormous total of 550 gr. The patience of the physician and the fortitude of the patient were finally rewarded by the complete recovery of the

¹ Knowles: "Notes on Some Results in Kala-azar," *Indian Journal of Medical Research*, 1918, 548.

² Archibald and Innes: "Clinical and Pathological Notes of a Fatal Case of Bilharzia treated by Tartar Emetic," *JOURNAL OF TROPICAL MEDICINE AND HYGIENE*, 1919, 53.

patient from the most virulent of all the forms of trypanosomiasis, and the patient remains free from symptoms both of the disease and of antimony poisoning until the present day.

LESS TOXIC COMPOUNDS OF ANTIMONY.

Since the risks of antimony poisoning as the result of intravenous injections, though apparently not very great, cannot be ignored, other forms of antimony should be sought combining equal therapeutic effects with diminished toxicity. Antimony and arsenic are so closely allied in their chemical characters that this condition would probably be brought about by the production of organic compounds of antimony. Since antimony and arsenic are so closely allied in their chemical characters and the toxicity of arsenic has been greatly reduced without diminishing its therapeutic action by introducing arsenic in organic combinations in such drugs as salvarsan and its substitutes, it would appear highly probable that similar organic compounds of antimony could be produced and that the effects of the antimony would be similarly influenced.

In view of the prevalence of trypanosomiasis, leishmaniasis, and bilharziasis in various parts of the world and the undoubted beneficial action of antimony compounds on these diseases, the production of thorough investigation of such organic compounds of antimony is one of the pressing problems of the day in tropical medicine.

Meanwhile Sir Leonard Rogers¹ has drawn attention to the occasional danger from the toxicity of tartar emetic intravenously, and has done the pioneer work in searching for equally efficient but less toxic forms of antimony. In 1916 he recommended sodium antimony tartrate, Plimmer's salt. More recently he has employed colloid antimony sulphide intravenously in kala-azar. He found it effective in smaller doses, being retained in the blood longer than the soluble tartrates of antimony, and concludes that colloid antimony sulphide appears a distinct advance on soluble antimony tartrates. It is evident that colloid antimony sulphide given intravenously would be well worth trying in bilharziasis.

Rabies.

DIABETES AND ITS DIETETIC TREATMENT. By B. D. BASU (Major, I.M.S., retired). Pp. 104. India: The Panini Office, Bhuvaneshvari, Ashram. 1918. Ninth edition (revised and enlarged). 1s. 8d. net.

It is very gratifying to see the ninth edition of this handy book, which is now so well known to the medical profession and the laity, as embodying the knowledge of the sacred books of the Hindoos and modern science.

¹ Rogers; "Colloid Antimony Sulphide in Kala-azar," *the Lancet*, 1919, i, 505.

LE CHOLERA. Par H. Violle, de l'Institut Pasteur. Preface de E. Roux, Membre de l'Institut Pasteur, Directeur de l'Institut Pasteur. Paris, 1919. Un vol. gr. in-8, de 618 pages, avec 100 fig. cartonne. Masson et Cie (Editeurs), 20 fr., plus 10 per cent.

This is a comprehensive work dealing with the historical epidemiology and pathology of cholera as known in all parts of the world. The author, from personal experience in many countries, supplies full details of symptoms, prognosis, anatomy and diagnosis of both cholera and of pseudocholera. Treatment for all stages is carefully considered. The bacteriological features in all aspects, detection, culture and prophylaxis, and the treatment of carriers are discussed in a manner that is a model of French science.

THE URETHROSCOPE IN THE DIAGNOSIS AND TREATMENT OF URETHRITIS. By Major N. P. L. LUMB, O.B.E., R.A.M.C. (T.C.). With 40 original illustrations. Pp. xii + 51. London: John Bale, Sons and Danielsson. 1919. 10s. 6d. net.

The author has succeeded in accomplishing his object—namely, to represent the effect of treatment on the lesions of urethritis that can be observed with the urethroscope. Great efforts are being made to increase knowledge of urethritis, especially the treatment and thorough cure, so as to avoid complications to the sufferers, as well as to prevent the disease spreading to others. To accomplish this a complete knowledge of the urethra at all stages of the disease is necessary; and—more important—it is necessary both for students and for teachers to know to what extent an appearance at any one time indicates both past conditions and probable future course.

The book commences with the manipulation of the urethroscope and its appurtenances, during observation and operations. Next the normal and pathological appearances of mucosa and glands. Not less useful is the account of continuous appearances in the course of typical cases. The book concludes with indications when to use and when not to use the urethroscope. The illustrations are so absolutely life-like that, however few cases are examined frequently and continuously, anyone can acquire a perfect knowledge of urethral conditions, certainly of gonorrhoea.

Rabies in Northern Brazil.—(Passos, December, 1918, i, No. 3-4) reports what he says is the first case of rabies in man that has ever been recognized at Manáos. Rio, Pernambuco, S. Catharina, Rio Grande do Sul, and Belem have each now a Pasteur Institute, and Passos pleads to have one organized for Manáos. He relates that many dogs, cats and other animals developed influenza, but there seemed to be just preceding this an epizootic of rabies among the animals.

Original Communications

BRIEF NOTE ON THE CULTURAL CHARACTERS OF *TRICHOPHYTON BALCANEUM* CAST., THE CAUSE OF A PSEUDO *PITYRIASIS CAPITIS*.

By ALDO CASTELLANI, M.D., M.R.C.P.

Member Interallied Sanitary Commission.

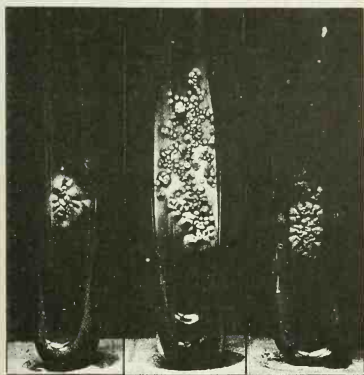
IN Macedonia, I have several times met with a peculiar type of trichophytic affection which clinically, in all my cases, was quite different from the usual type of trichophytosis, resembling more a diffuse form of pityriasis sicca. It was observed in adults only. The whole scalp was often affected, presenting a large amount of pityriasis squamea. There was some thinning of the hair, resembling clinically the loss of hair one observes in severe chronic cases of pityriasis (Seborrhœa sicca) rather than in trichophytic affections. Of the clinical aspects of the condition, I will, however, give a full account in a future publication, and will limit myself here to giving only a brief description of the cultural characters of the fungus.

The fungus which was present fairly abundantly in the squamæ was isolated by inoculating the squamæ, after keeping them for a few minutes in alcohol on glucose agar. The following are the principal characteristics of the fungus:—

The growth on glucose agar is very slow; the surface of the growth is generally crinkled or cerebriform. Glycerine is very rapidly liquefied. On serum, the growth is very slow and scanty, or

potatoes and carrots is very scanty. As regards the action of the fungus on the various sugars, carbohydrates, &c., it may be said that it does not produce gas in any of them, but may produce a slight amount of acidity in levulose, arabinose, and glycerine (see table).

Motility	...	...	...	...	...	O
Gram...	...	...	...	...	...	O
Gelatine	...	...	...	...	( 4th day 8th 12th)	+ + +
Serum	...	...	...	...	( 4th 8th 12th)	O O O
Litmus milk	...	...	...	...	( 4th 8th 12th)	O A s c A c
Lactose	...	...	...	...	( 4th 8th 12th)	O O O
Saccharose	...	...	...	...	( 4th 8th 12th)	O O O
Dulcité	...	...	...	...	( 4th 8th 12th)	O O O
Mannite	...	...	...	...	( 4th 8th 12th)	O O O
Glucose	...	...	...	...	( 4th 8th 12th)	O or A v s O or A v s O or A v s
Maltose	...	...	...	...	( 4th 8th 12th)	O O O
Dextrin	...	...	...	...	( 4th 8th 12th)	O O O
Raffinose	...	...	...	...	( 4th 8th 12th)	O O O
Arabinose	...	...	...	...	( 4th 8th 12th)	A A s A s
Adonite	...	...	...	...	( 4th 8th 12th)	O O O
Inulin	...	...	...	...	( 4th 8th 12th)	O O O
Starch	...	...	...	...	( 4th 8th 12th)	O O O
Salicin	...	...	...	...	( 4th 8th 12th)	O O O
Lævulose	...	...	...	...	( 4th 8th 12th)	A v s A v s O or A v s
Galactose	...	...	...	...	( 4th 8th 12th)	O O O
Glycerine	...	...	...	...	( 4th 8th 12th)	O or A v s O or A v s O or A v s



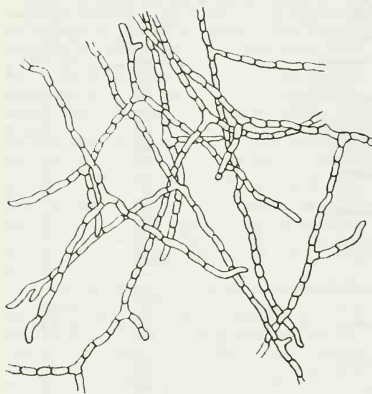
absent. The medium is not liquefied. In *litmus milk*, after several days, there is often a slight acidity and the medium clots. The growth on

Hanging Drop Cultures.—In young hanging drop cultures (glucose broth), the growth consists of septated mycelial filaments. So-called free spores are not seen. Occasionally, a few pedunculated pseudo-conidia may be observed on the mycelial filaments.

Absence of Pleomorphism.—A most interesting feature of this fungus is that, as a rule, it does not show any sign of pleomorphism, even after having

been subcultured on glucose agar media for more than two years. This is in contrast with what one sees in practically every trichophyton I know of.

Conclusion.—In Macedonia, from cases of a peculiar condition of the scalp resembling a severe



Hanging-drop culture.

diffuse type of pityriasis sicca, rather than a trichophytic affection, a fungus was isolated which temporarily I have placed in the genus *Trichophyton*, Malstem 1845. Taking into consideration the cultural characters I have briefly described, the interesting feature of complete absence of pleomorphism, and the very peculiar clinical appearance the fungus induces, I believe it to be a new species, for which I have suggested the term "*Trichophyton Balcanicum*."

CASE OF BILHARZIA DISEASE COMPLICATED BY STONE, CURED BY TARTAR EMETIC TREATMENT.

By F. G. CAWSTON, M.D., Cantab.

SOME twelve years ago Lieutenant A. contracted bilharzia disease when bathing in the Umhlatazana and Umbilo rivers near Durban. I have searched these rivers and found *Physopsis africana* plentiful in both. Though none of the specimens I procured from them harboured the bilharzia, specimens of the same species obtained from a neighbouring suburb in 1916 showed an infection with the definite human parasite of 23 out of 236. The height of infection of these two rivers may be judged from the fact that 43 of the children who attend the Indian government-

aided school on the hill between the rivers complain of hematuria, and one boy of 13 years, whose urine has begun to clear after two intravenous injections of tartar emetic, states that this is the first occasion his urine has been clear for eighteen months. When first examined, the urine of this child was almost the colour of pure blood and contained numerous spine-pointed eggs.

Since Lieutenant A. became infected the hematuria has been aggravated by any severe exertion. Occasionally he has passed large clots of blood. Treatment with medicines only alleviated his condition. In October, 1914, he was confined to bed for 10 to 14 days in one of the military hospitals in German West Africa on account of exacerbation of the disease. At the present time I have under treatment a corporal who contracted bilharzia infection from the Unga river in German West Africa. His urine shows the typical spine-pointed eggs (see below, Chart II).

On October 16, 1916, when Lieutenant A. was at No. 2 General Hospital in London, a cystoscopic examination was made, to determine the cause of his symptoms which had been aggravated by active service conditions at Aylesbury. A group of yellow spots was seen in the bladder wall; these had the appearance of "stones" or "calcified bilharzia."

Ten days later, on October 26, the left kidney was explored by lumbar incision; though several X-ray photographs had proved negative. No calculus was found, but the left ureter was thickened. Microscopic examination of the kidney substance showed "chronic inflammation round masses of chalky concretions, with considerable infiltration of eosinophile cells." The report mentions "calcified bilharzia ova," some with "terminal spines," and continues:—

"In some, in which the process of calcification is only beginning, what is apparently the embryo can be seen in cross section." At the Royal Infirmary at Leicester on July 2, 1918, a microscopic examination revealed numerous eggs, a quantity of mucus and a little blood.

At Addington Hospital, Durban, on March 3, 1919, the bladder was sounded for vesical calculus, but the result was negative. The following day bilharzia eggs were detected in the urine.

On March 5, X-ray examination showed opaque shadows in the region of the left kidney. Three pictures were taken and all showed the shadows.

On March 13 the left kidney was again explored, but no calculus detected.

On April 2, Captain Birkett, S.A.M.C., officer commanding Auxiliary Hospitals, Durban, asked me to take over the treatment of the case in the Grasmere Convalescent Home. I found numerous blood-cells and a few typical spine-pointed eggs containing miracidia in an alkaline urine. With a hypodermic syringe I administered a half-grain of tartar emetic in 1 c.c. of sterile water into the left antebrachial vein and prescribed a t.d.s. mixture containing ac. bor. gr. viii, tr. nuc. vom. ℥ viii and inf. buchu ℥ xv.

On April 4 I gave him tartar emetic gr. ½ and, in view of his severe renal colic, a second t.d.s. mixture containing tr. hyosc. ℥ xv, pot. cit. gr. xv and inf.

buchu ad 3ss. I found blood cells plentiful in his acid urine, but no ova. However, the laboratory reported ova still present on March 6 and numerous amorphous phosphates.

On April 8 I gave him tartar emetic gr. i. The following day the acid urine contained numerous phosphates, a few blood cells, but no ova. As there was still a good deal of pain in the region of the left kidney, I prescribed hexamine gr. v t.d.s. and a mixture containing sod. sal. gr. viii and tr. nuc. vom. ℥ viii, instead of the boracic mixture.

On April 10 the Laboratory reported an absence of ova, casts and blood cells from the urine.

On April 11, I gave him tartar emetic gr. 1½ and repeated the same dose on April 13. On the evening of April 13 the patient passed a flattened phosphatic calculus, ½ in. long and ¼ in. broad; it weighed gr. iii.

The Laboratory reported absence of eggs from the urine on April 15.

On April 17 the patient passed a second calculus *per urethram*. It was similar in size and shape to the first one and faceted on one side. Up till this time he had been confined to bed practically continuously since his admission on April 2, and his temperature was usually raised at night, though never over 100° F. From this time he was able to take moderate exercise and remained in bed after the weekly injections for a few hours only.

No ova were detected in the urine at the Laboratory on April 24, and the urine was free from ova on April 25; but, as numerous phosphates were still present in the specimen I examined, I added sodium acid phosphate to the hexamine he was taking. I repeated the gr. 1½ dose of tartar emetic intravenously on April 25 and May 2.

CONCLUSIONS.

(1) That the condition was an old-standing one, contracted previous to going on active service.

(2) That the disease was aggravated by active service conditions; for persons who harbour the bilharzia parasite know that they cannot undertake severe exertion.

(3) That the formation of the calculi took place subsequent to his treatment in London, and, like other bilharzia cases in Natal, he was predisposed to such complications.

(4) That the tartar emetic injections destroyed the parasites in the blood-stream.

(5) That the destruction of the parasites enabled the congestion in the tissues to subside, and that this process was assisted by the use of urinary antiseptics and sedatives.

(6) That the subsiding of the congested tissues enabled the calculi to pass out in the urine.

Lieutenant A. Chart to show progress of the case.

April	Urine	Tartar Emetic
2	Bilharzia ova (spine-pointed)	... gr. ½
4	free	... gr. 1
5	Bilharzia ova	... —
8	free	... gr. 1

April

	Urine	Tartar Emetic
10	free	... —
11 ... ..	...	... gr. 1½
14	calculus	... gr. 1½
15	free	... —
17	calculus	... —
19 gr. 1½
24	free	... —
25	free	... gr. 1½

May

2 gr. 1½
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CHART II.

Corporal M. contracted bilharzia disease at Uranga river whilst on active service in German West Africa in 1915.

Feb.

	Urine	Tartar Emetic
8	cloudy blood cells spine-pointed ova	gr. 2 in morphia suppositories per rectum on alternate nights
13	numerous ova (hatch)	—
17	ova hatch	gr. ½ intravenously
20	clearer ova hatch	—
23	—	gr. 1 intravenously

March

1	clear, neutral ova hatch	—
3	—	gr. ¾ intravenously
8	flakes, acid, ova hatch	—
10	—	gr. 1½ intravenously
16	blood cells, very few ova	—
17	—	gr. ½ intravenously

April

5	neutral blood cells, no ova	—
10	—	gr. ½ intravenously suppositories discontinued
22	(Laboratory report) no ova	gr. 3 per rectum on alternate nights

May

2	acid, blood cells, no ova	—
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PREVENTION OF SCURVY BY MALT, TO BE FOUND IN CAPTAIN COOK'S ACCOUNT OF HIS VOYAGE.

"THE malt must be ground under the direction of the surgeon and made into wort, fresh every day, in the following manner:—

"(1) Take one quart of ground malt and pour on it three quarts of boiling water. Stir them well and let the mixture stand close covered up for three or four hours, after which strain off the liquor.

"(2) The wort, so prepared, is then to be boiled into a panada with sea biscuit or dried fruits generally carried to sea.

"(3) The patient must make at least two meals a day of the said panada and should drink a quart or more of the fresh infusion, as it may agree with him, every twenty-four hours.

"(4) The surgeon is to keep an exact account of its effects."

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THE JOURNAL OF

Tropical Medicine and Hygiene

SEPTEMBER 15, 1919.

TROPICAL LASSITUDE AND ENNUI.

Nothing perhaps better describes a condition which many young men in the tropics fall into than that of being "hipped." It is a vulgar expression, no doubt, but one which, like so many another colloquialism, fits the occasion.

The terms "low spirits" and "ennui" supplement the peculiar phase of mind indicated and serve to bring home to one the wretchedness in which many men find themselves. It usually occurs amongst those who have been in the tropics for a few years and have not yet had leave to re-visit their home. It is complicated still further by an element of home-sickness, although it may be this does not appear evident to the sufferers, nor would be allowed by them as playing a part in the ensemble.

The onset is gradual; it comes as a reaction to the excitement of starting in a fresh field of life, in an environment of a different character to anything they have been accustomed to, and to a feeling of freedom from the restriction of the conventionalities of home and family life. Touch with home has been kept up by letters passing to and fro; the young man enjoyed writing to his family all about the place he dwells in, about his work, his new friends or his recreations. As time passes there is less to write about; the things that concern his daily life cannot, he thinks, possibly interest those at home; and they in turn find less and less to tell him, unless they are gifted beyond the usual run of parents following their daily routine of life. The curious thing about the onset of this ennui is that it occurs more often amongst those dwelling in town than amongst those living in the more isolated districts, such as a rubber or tea plantation, or in woods and forest departments, &c. If he belongs to a large merchant's firm where it is the rule that a number of the juniors mess together, so that there is no want of company, after a time the mess becomes aware that one of their number appears to gradually become more silent, that he is apt to leave the dinner table the moment the meal is finished, and retires to his room or occupies a lounge chair on the verandah deeply immersed in a book, and talks but seldom to his companions. He is wont to make a sudden departure and with a rather curt good-night he goes to his room, where his light may be seen burning late into the night. He preserves silence for the most part at breakfast, which not infrequently he strives to get through and leave for his office before the others are about. His peculiarity of temperament begins to be noticed by his messmates and they wonder amongst themselves what is wrong. One thinking he has been slighted in love; another that he is not well, "got fever or something"; that he has lost money, and so on. In the office he gets through his day's work in a dogged and sullen manner, without jousness, nor in his conversation with his seniors does he show interest or enthusiasm in his work, and he performs it as a necessary task in a mechanical manner. Immediately the office closes he goes home and passes the time until dinner in reading or lounging or thinking how wrongly he is being understood by everybody.

In this way the depression increases; exercise is neglected and companionship shunned; digestion suffers, and he is driven to seek the doctor's advice.

Nothing organically can be found amiss, but the doctor soon sees what is wrong and tries to cheer him up. This in time is shown to be impossible and suggestions of suicide, at first regarded with amusement, but afterwards becoming so persistent, and the patient's silence, pale appearance, and the impossibility of banishing the depression which is patent to everyone, become so marked that steps have to be taken to mitigate if not cure this peculiar state of mind lest what was regarded as ridiculous chatter may become a really serious and dangerous mentality. At last it becomes apparent that a change is necessary and is suggested by the doctor. The patient refuses to see it, insists that it will do no good, and retires within doors and within himself in stubborn resentfulness. Whole days are now spent at home from time to time, extending to several consecutive days and even to a whole week. At last an ultimatum is delivered, when the authorities insist on resignation or leave home is to be taken. The sufferer himself, not willing to face his relatives at home in his present deplorable state, may suggest change to some resort near by, or a trip to some adjacent foreign country. The wise physician should not allow of this; a trip to anywhere but home in the case of a man who becomes depressed in mind to a serious extent, be it from the depression due to malaria, dyspepsia or "climatic lassitude," which most frequently has some pathological, although it may be undiscoverable, basis, will be but waste of time. We have to deal with a mentality which we must recognize. Is there anything amongst all the pleasures of anticipation equal to that of the boy's going home after his first term at school? Subsequent visits are pleasurable, but none approach the thrill that the sight of home brings to the lad after his first spell of absence. It is well that this fact should be remembered and acted upon; the mind of the boy is that also of the youth who has been away not a term but a number of years and the feeling of the returning home after the first spell abroad, however cloaked, is as keenly cherished in the more mature years as they ever were by the mere boy. Therefore it is a trip home that is the only cure, not a makeshift by visiting another clime or another country. However we muffle it, home-sickness is a potent factor in many a young man's being run down by climate.

The step is finally taken, however, and he goes home, apparently against his will, and determined that he will return after as short a stay at home as possible. The mind is so warped that, like the long-time prisoner who, when given freedom, desired to be put back again to his prison cell, so does the depressed young man, who refuses to be comforted, feel in regard to his enforced departure from the environment where his troubles developed.

Sometimes it happens that on the way the depression which afflicts the man whose course we are tracing, passes off with the initial sea-sickness. Sometimes it is delayed a longer time, and when he comes in contact with other passengers who are "sympathetic" he makes acquaintances and even

friendship with a fellow traveller, be it a man or woman, and his spirits rise in consequence, and by the time he reaches home the depression has left him and he begins to enjoy life. On the other hand, the recovery is delayed until after home is reached and his relations encourage him to go about and see old friends. Gradually as he comes to be made much of from his having travelled and seen the world, and he is granted a position of importance in the neighbourhood, games are taken up and, if in the country, riding, hunting and shooting bring him into a class of society he had previously never entered and the depression gives way to exaltation and a thorough zest for things sporting. After a twelvemonth he returns to the tropics a man of parts and never likely again to fall back into his old pre-leave ways. A mistake which is however not infrequently made, is that the leave is curtailed, two or three months only are spent at home, and the man returns just as he is beginning to enjoy home life, and when he takes up his old life he sighs for home again and the short relaxation he had enjoyed whets his appetite for more. Home-sickness supervenes and he finds no pleasure in his daily work abroad, and broods over his "exile," as he terms it. The leave of a few months only after a long time abroad is unsatisfactory, and the glorious time he was beginning to have at home has been his undoing. Allow the leave to continue another six months and the life of idleness at home begins to pall, its continuance becomes irksome, and he goes out again glad to be back to a life of activity and invigorated in his whole being.

Such is the effect of leave upon many men, and it would be well were medical men to take a wide view of the matter and allow common sense to play its part. Many a man is made or marred by injudicious handling. The first leave home is the important factor in the future of the tropical immigrant, subsequent leaves are in a wholly different category and are of less consequence in shaping the future of the lives of men returning from the tropics. After an absence abroad of say, over six years, when leave is curtailed to a few months, say three or four, at home, the body may be improved in some measure physically, but the mental condition may be upset to a degree which may be calamitous. Without knowing it he becomes home-sick and being unsatisfied often leads to the taking of stimulants and settling down to the "native-wife-life," which once established few men can throw off. The permission to marry is difficult to obtain, the natural instinct is thwarted, with the result that the lives of an enormous number of young men of our community, selected after physical and mental tests, representing the pick of the youth of the country, are lost to the race, marrying either in advanced middle-age with their escutcheons blurred, or refusing to marry at all, having spent their power in the production of a half-breed progeny without country or kin. This is a black record to place before youths about to take up life in the tropics, but although true in many cases, there are brilliant exceptions.

Annotation.

Leprosy in Northern Brazil (J. A. Atar, *Brazil-Medico*, May 3, 1919).—The Pará Leper Asylum was founded in 1816. In 1900 there were 25 admissions and in 1917, 112, the authorities having recently made declaration of the disease compulsory. Of the total 882 new cases since 1899, 600 were males. Only 8·5 per cent. were under 10 years of age; 27·21 per cent. were between 10 and 20; 20·29 per cent., 20 to 30; 21·54 per cent., 30 to 40; 12·47 per cent., 40 to 50; and from 5 to 0·22 per cent. in a declining scale in the following decades of life. Atar does not know of any other statistics classified by ages. He says that the new cases now in Pará are nearly all in subjects under 20, and argues that the immunity of the older adults is probably due to an autovaccination from repeated small inoculations of the virus. This assumption would explain the relatively small percentage of children that develop leprosy in a leper's family. He mentions further that the distribution of leprosy in Pará does not coincide with that of malaria. In the Gurupa malarial zone there has been scarcely one new case of leprosy in the last twenty years, and he queries whether this may not be the direct consequence of the ravages of the malaria among the children. Leprosy has been growing less frequent at Pará since malaria has been making greater headway there.

PROFESSOR S. KARTULIS, of Alexandria, writes to point out that in a recent paper by Captain F. L. Armitage, N.Z.M.C. ("Amoebic Abscess of the Brain, &c.," this journal, April 15, 1919, p. 69), the following incorrect statement occurs: "Amoebæ enter the circulation via the mucosa of the intestine. . . . Their passage through the wall of the intestine was first observed by Harris in 1898 and confirmed later by Koch." We regret that this erroneous statement should have crept into our pages. The error arose in the following way. In the first draft of Captain Armitage's paper, which reached us when he was serving in France, the passage in question ended as follows: "Their passage through the intestine was first observed by Harris in 1898 and confirmed later by Koch in 1883." As the statement clearly involved a contradiction, the words "in 1883" were marked in the manuscript, in order that Captain Armitage might correct the error later in the proof. Unfortunately, he was recalled to New Zealand before the proof was ready, and the passage remained as originally written, but with "in 1883" deleted. Captain Armitage is now in New Zealand, but we have no doubt that his statement was merely a *lapsus calami*—"Harris in 1898" and "Koch in 1883" having been accidentally transposed. The facts are, of course, as Professor Kartulis points out, that *E. histolytica* was found in the submucosa by Koch in 1883, and traced into the blood-vessels by Kartulis in 1889; whilst both these observations were confirmed by Harris in 1898, and later by many other workers.

Abstract.

THE RECOGNITION OF TROPICAL SPRUE IN THE UNITED STATES.¹

By EDWARD J. WOOD.

THE majority of tropical sprue cases are occurring in the Southern states, though one of my series came from New Hampshire, one was seen in Syracuse (a Porto Rican case), and one came from the Johns Hopkins Hospital. It is evident, therefore, that a familiarity with its cardinal symptoms would be helpful to many in the profession.

SYMPTOMS OF SPRUE.

Sprue is characterized by three groups of symptoms: those of the mouth, the intestinal tract, and the blood.

My observation leads me to avoid too fine a line of differentiation of the mouth symptoms. Suffice it to say that the tongue is inflamed and pink, with congested fungiform papillae, eroded patches and superficial cracks on the dorsum and edges. Crombie's molar ulcer is frequently mentioned as a helpful symptom, but I have observed it even more frequently in pellagra. The tongue in sprue is quite different from the tongue in pellagra, where it is more pointed and not so flabby. In sprue, it is very much paler than in pellagra. There is also, in sprue, an approach to the cobblestone appearance which does not occur in pellagra. After a short experience with the two diseases, any observer may expect to make a correct differentiation by examining the tongue alone.

The diarrhoea in sprue is the most distinctive symptom. The bowel movements occur from midnight until about 10 o'clock in the morning. There then occurs a cessation until the next day. If the cessation does not occur, there will be, at least, a marked diminution in the number of movements in the afternoon and early hours of the night. The bowel movements are very large, suggesting at once a pancreatic condition. The reaction is decidedly acid, and there is much gas mixed with the faeces. Examination of the faeces reveals a large amount of fat. The stools are light in colour and give a positive reaction for hydrobilirubin. Schmidt-Strassburger test diet shows a fat loss of 49 per cent. and a nitrogen loss of 15 per cent. P. H. Bahr,² in his Ceylon cases, found a fat absorption of from 70 to 90 per cent., which is much greater than was shown in our experience. In addition to this failure in the utilization of fat and nitrogen, there are other evidences of pancreatic insufficiency indicated by the thymus nucleus test and the Sahli glutoid salol capsule test.

The question of the relationship of the pancreas cannot be discussed here, but it is hoped that an

¹ Read before the Section on Practice of Medicine at the Annual Session of the American Medical Association, Atlantic City, June, 1919.

² Bahr, P. H.: *Trans. Soc. Trop. Med. and Hyg.*, London, 1914, p. 161.

interest in this fascinating problem may be aroused and that the material so close to hand may be utilized in the solution of an important problem. The difficulties of the problem are enhanced by a marked variation in the degree of pancreatic digestion, and also in the utilization of fat and nitrogen.

BLOOD PICTURE.

The most interesting phase of the study of sprue at this time is the blood picture. In a large number of cases the colour index is above 1, and a case now under observation gives a persistent index of 1.66. The anaemia has always been regarded as secondary; but it is important to show how the condition may be confused with pernicious anaemia, as many cases of sprue have been called pernicious anaemia. On the other hand, some cases of pernicious anaemia have been diagnosed as sprue.

There is marked variation in the size of the red cells. There was found in a recently studied case a decided preponderance of over-sized cells, as well as numerous dwarf-cells. There also occurs poikilocytosis. It was noted that there were many very pale cells in the field when the blood was stained with any of the eosinates of methylene blue. Stipple cells were very rarely found. No nucleated red cells were found.

Notes of a case now under observation will be briefly presented, chiefly on account of the blood picture.

REPORT OF CASE.

Case.—Mrs. H., aged 37, the mother of three children, was married to a saw mill worker moving from point to point in North Carolina, and living under rather unfavourable hygienic conditions.

The present trouble is said to have begun at the birth of her third child in September, 1918. She denied ever having had any form of anaemia before. Her physician's information was limited because of the fact of her moving about at short intervals from one saw mill to another. Following the birth of the third child she had rather a severe influenza and has never been well since.

Owing to a sore mouth and tongue, in addition to extensive pyorrhea, she was advised to have all her teeth removed, which she did.

Throughout the winter the diarrhoea, which was of the matutinal character, and the anaemia persisted. There seemed to have been only the very slightest variation in the severity of either symptom.

The physical examination was practically negative. The liver dulness was slightly reduced. The spleen was not palpable. The patient had lost some flesh.

The red blood count was 600,000; the hemoglobin, 20 per cent.; the colour index, 1.66. No megaloblasts or normoblasts were found on repeated examination of many slides. There were no stipple cells. There was a marked difference in the way in which the red cells took the stain. This was shown chiefly in numerous strikingly pale cells. There was a preponderance of oversized red cells, the percentage ranging from 25 to 30. The fragility test of the red cells

with hypotonic salt solutions showed that hemolysis had begun at the 0.45 per cent. point and was complete at the 0.3 per cent. point. This we regarded as normal.

The white blood count was 3,200; polymorphonuclears, 40 per cent.; large lymphocytes, 16 per cent.; small lymphocytes, 44 per cent. No parasites of malaria were found. The blood Wassermann test was negative.

There was an absence of free hydrochloric acid in the stomach contents, and marked stasis.

The faeces were light yellow, and were very acid in reaction. Crystals and droplets of fat were found on microscopic examination, after staining with sudan III. The beef nucleus test showed that while the nuclei of the muscle fibres were in great measure digested, there persisted nuclei which had not been completely digested. The agar tubes of Einhorn failed to give returns from which any conclusions could be drawn, probably because of faulty technic. The three-day test diet was given, and the examination to determine the absorption of fat and nitrogen undertaken; but they cannot be reported on now.

There was no tenesmus or blood with the diarrhoea. The movements were for the most part large.

RELATION OF SPRUE TO ANAEMIA.

Our study of sprue has led us to think that it may be a bridge between the anaemias experimentally produced by the colon bacillus, and possibly others of the usual intestinal flora, and an anaemia which probably owes its origin to a true intestinal disease, one which more nearly approaches pernicious anaemia than any of the anaemias produced experimentally. We are now preparing for a study of the colon bacillus isolated from the duodenal contents in sprue.

It is worthy of emphasis that the remissions in sprue are as striking as in pernicious anaemia. That remarkable recurrence which is so often seen in pernicious anaemia, even after years of quiescence, is also seen in sprue.

What the relation between the two diseases is, if any, remains to be seen, but it is not improbable that a more accurate study of sprue will shed light on many obscure corners in the study of pernicious anaemia.

If the sprue stool and tongue are considered, even in the absence of skin lesion, there should be no confusion with pellagra.

ABSTRACT OF DISCUSSION.

Douglas Vanderhoof.—Chronic or recurring diarrhoea, that is, characterized subjectively by absence of pain and tenesmus and objectively by presence of blood, mucus and pus in the stools, is generally due to one of four causes: first, achylia gastrica with diarrhoea, a matutinal diarrhoea. This cause of diarrhoea accounts for from 90 to 95 per cent. of the cases of chronic or recurring diarrhoea characterized by absence of pain and tenesmus, by blood, pus and mucus, in the stools. Second, cases of pancreatic achylia, characterized by absence or deficiency of the pancreatic ferment in the duodenal contents or in the

stools, perfectly definite cases, not occurring very frequently but worthy of consideration. Third, the type of diarrhoea in pellagra, and fourth, we must consider sprue. Certain symptoms are common to all these four forms of diarrhoea, namely, stomatitis, anaemia and weakness, and loss of weight; and from these symptoms it is difficult to differentiate between these four forms. Of course, in sprue the patient goes on to extreme emaciation, whereas in pernicious anaemia or achylia the patient is not infrequently a well nourished individual. Then, again, the picture is confused by the fact that either a gastric or pancreatic achylia may complicate pellagra or may complicate sprue, and it is due to this fact undoubtedly that so much confusion has existed in the establishment of sprue as a clinical entity. There are certain cases of so-called sprue that are absolutely relieved by the exhibition of pancreatic ferment in the diet. Other cases of sprue are relieved by an autogenous streptococcus vaccine. As to the differentiation of these diseases: In achylia gastrica, the absence of the gastric secretion is characteristic; in pancreatic achylia the deficiency of the pancreatic ferment in the duodenal contents or in the stools is characteristic. In pellagra, the skin lesions and the mental symptoms help, whereas in sprue examination of the stools is decisive.

Joseph H. Pratt.—The patients with tropical sprue that have come to America from the West Indies and from China have had fatty stools. In other words, the diarrhoea is a fatty diarrhoea. The resemblance of the stools in these cases of sprue to those in complete obstruction of the pancreatic duct is very striking. In three or four cases we did metabolism experiments to determine the amount of fat that appeared in the faeces, and we found that the faeces contained so much fat that microscopically they seemed to consist almost entirely of fat. There is no doubt that a great many cases are developing in the northern states and are unrecognized. We should always consider the possibility of sprue in every case of chronic diarrhoea with loss of strength and anaemia, and examine the stools for fat. The tongue may not be sore at the time the case comes under observation, and the anaemia may not be marked but in the cases I have seen, the fatty diarrhoea has been the striking feature. I studied very carefully the case of a patient who had not been out of New Hampshire for five years. In that patient the subsequent course and the clinical history were typical of sprue, and if there is one case in the northern states, there must be others.

W. C. Alvarez.—We see many cases of sprue in San Francisco, mainly in people returning from the Orient and India, but there is something more than the pancreatic lesion present because I have seen pancreatic fatty stools and stools of sprue. In sprue the characteristic thing in all cases is a change of the type of flora in the stools. If you put a sprue patient on a meat diet for a while, he generally improves very markedly. Many patients get well, the bacteria in the stools change, and the stool changes in colour. It seems that if it were a pancreatic lesion, the large amount of meat which you feed would not

be digested any more than the fat. Take a patient who is comfortable and give him starch, he immediately bloats up with gas if some of those yeasts and moulds are still present. I have seen remarkable cures from the use of vaccine. The strawberry cure is one of the strangest things I have ever seen. Why a man with a violent diarrhoea can eat several boxes of strawberries and improve on it is a puzzle. You can differentiate sprue from other types of diarrhoea by feeding the patient on a box of strawberries.

Emanuel Libman.—Five years ago I saw a case of secondary sprue in a patient who had never left New York. There was complete achylia and disturbance of the reflexes. Up to that time no cases had been called sprue with a colour index above 1. These cases are of importance, and we must diagnose between sprue and pernicious anaemia. If you analyse the symptomatology of sprue and pernicious anaemia, you will see a close relationship. There is a mistaken idea that in pernicious anaemia the symptoms are due to anaemia, but if you perform transfusion, you can remove the symptoms, the sleeplessness, the poor digestion, &c. and you can raise the functional capacity of the kidneys, but you do not remove the tongue lesions, the achylia, or the spinal cord symptoms. Evidently an anaemia is produced by a toxin which has an affinity for the blood forming organs and the spinal cord. In sprue there is a toxin which attacks the gastro-intestinal system and the tongue. As to the spinal cord changes, I do not know what they are, but there is an important difference there. If the toxin of sprue is found, it will give a lead to look out for pernicious anaemia.

As to the pancreas: I have seen a few cases of sprue and have been struck by the resemblance to pancreatitis. In one case of sprue studies of the faeces had shown that the pancreatic secretion was entirely missing.

M. L. Graves.—An interesting feature of one case is the age of the patient—9½ years. She presents voluminous stools associated with the organism described in the Porto Rico cases. The child presented an epileptoid syndrome which I have not seen in other cases of sprue. The attacks are without a definite aura and occur with great frequency, from three to twenty during the day, associated with great pallor and great sweating. The organisms have also been recovered from the mouth in this particular case. This relationship of epileptoid symptoms to sprue has not yet been established.

Sand-fly Fever and Dengue (J. W. D. Megaw, Indian Medical Gazette, July, 1919).—At first sight dengue and sand-fly fever appear distinct, but the evidence when analysed is by no means convincing. Sand-fly fever is either a modification of dengue or is closely allied to dengue. Sand-fly fever is considered to differ from dengue by absence of a rash and of a secondary rise of temperature, but in many outbreaks of dengue a number of the cases show neither rash nor secondary fever. Possibly dengue is conveyed by a mosquito, while sand-fly fever is caused by a sand-fly.

Original Communications.

SOME PRACTICAL NOTES ON THE PREVENTION OF MOSQUITO BREEDING.

By JAMES A. DELMEGE, M.R.C.S., L.R.C.P., D.P.H.

Late Sanitary Officer 22nd Division.

THE following notes deal solely with methods for the prevention of mosquito breeding, and more especially with the practical details of such methods. Many of these, though apparently obvious, were only devised after considerable experimenting, and it is in the hope of assisting other practical workers that these observations are put on record.

This preventive work was carried out in Macedonia—chiefly during the summer of 1918—in an area of which the chief natural features were:—

(1) Rocky streams and deep ravines intersecting the hills.

(2) Scattered marshy areas and isolated chains of pools on the plain, and

(3) Large cultivated areas provided with irrigation channels.

The work was begun during the early part of April and continued till September when it was brought to a close by military operations.

The methods used were those suitable to an army in occupation of a mosquito-breeding area for a comparatively short period, and were therefore of a temporary nature.

While unsuited for dealing with mosquito breeding on a large scale with a view to permanent civil occupation of a tract of country, they should be easily adaptable in a modified form to the needs of any small community living in a malarious district.

My thanks are due to the N.C.O.s of the 39th Sanitary Section, who contrived and tested many of these devices, and to whom I am indebted for numerous suggestions.

The methods in use may be divided into two classes:—

(1) *Constructional*.—Canalization, &c.

(2) *Larvicidal*.—Use of cresol and paraffin.

Circumstances of ground and labour, &c., will generally determine which will be used, but in most cases a combination of the two was found best.

(1) CONSTRUCTIONAL.

(a) Canalization.

This is carried out with a view to:—

(1) "Planing" the sides of streams and thus doing away with crevices.

(2) Cutting off corners and thus straightening a sinuous stream-course.

(3) Carrying off excess water from marshes, pools, &c.

(4) Acting as part of a "herring-bone" system of drainage.

The following practical details are of importance:—

Shape.—The trench should be deep (not less than 1 ft. in depth), narrow at the base, and with sloping sides, as in fig. 1. This decreases the surface area of water and prevents the falling in or treading in of the sides, a fact which was very noticeable in the shallow, straight-walled trenches dug, as in fig. 2.



FIG. 1.

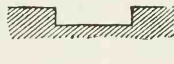


FIG. 2.

Edges.—It is well worth while to "bald" the edges completely, i.e., to turn back the sods for at least 1 ft. from the edges instead of merely cutting the grass short. This delays the regrowth to such an extent that the extra labour involved is well worth while.

Various other devices were also tried with a view to further reducing the rate of regrowth of grass. Spraying the edges with dilute cresol solution (about 1 in 500) was found to do so very considerably.

The stoning of the edges of channels and streams is to be avoided as breeding takes place in the crevices, but large stones placed about 4 in. to 6 in. from the edges are very useful in preventing the channel being trodden in by animals and men.

Stream.—This must be kept quite clear of twigs, water-weeds, small stones and green algae. The clearing of the latter is of the first importance, as has been frequently pointed out, on account of their liability to foster breeding. In the Balkan summer algal growth is very rapid, and a clear stream can become covered within two days.

(b) Covering of Tanks and Wells.

Mosquito breeding was found in nearly all tanks, wells, &c., whether open concrete cisterns, zinc tanks, or sunk wells—in these latter even at a depth of 10 ft. or more.

Sacking on a wooden framework was the material used for covering these in, the canvas being sand-bagged down at the edges. Puddling the edges of the covers round with clay is less trouble, but while satisfactory for a time, it soon cracks and needs constant inspection and renovation.

These sacking covers are light and easily made, but their liability to damage was found a drawback.

Light wood covers carefully caulked are the best; the wells thus covered rarely need subsequent attention. Corrugated-iron covers used in some places were found most unsatisfactory as being almost impossible to make mosquito-proof.

(c) Cutting back of Bush and Shrubs.

This, of course, is a measure of the very first importance. Sunlight acts as a very powerful deterrent to mosquito breeding, and in addition to this, in the case of marshy areas, it allows of the

drying up of boggy ground which often takes place to a quite remarkable degree after bush-cutting.

It is important that all bushes and branches, however sparse or high up, which overhang a stream or channel, should be cut back, not only to allow free access of sunlight, but to prevent twigs, &c., from falling into the water and forming a tiny back-water in which breeding will take place.

A good working rule is to have the bushes cut back so that a man can walk down the stream without touching bush on either side.

(d) Filing-in of Pools, &c.

This requires no comment in most cases, but considerable difficulties may be encountered when large deep pools are met with in the course of streams, and especially when they occur at the foot of a small fall, 4 to 5 ft. high, as they frequently do.

If possible it is best to circumvent the pool by leading the stream round it in an artificial channel. If this cannot be done, the slope of the fall should be cut down to as small a gradient as possible.

The pool itself should be filled in with earth and large stones. Those in which the channel is diverted to the side of the pool (fig. 3) stand a downrush of water far better than those in which a median channel is preserved (fig. 4).

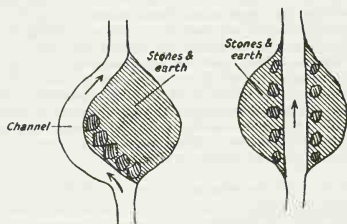


FIG. 3.

FIG. 4.

Special local conditions require certain modifications of method. The following were frequently met with:—

(1) *Streams Running through a Bed of Sand and Rocks.*—Such beds, generally at the bottom of ravines, were exceedingly common.

The best plan for dealing with these is, if possible, to move the stream away from the rocks instead of trying to deal with its original course.

An artificial channel is dug and the stream kept away from rocks, overhanging banks, deep pools, &c.

(2) *Small Marshy Areas.*—These present no difficulty. Those caused by the overflow from a stream are easily dealt with by diverting the stream; those due to a spring or to high subsoil water by "herring-bone" channelling.

(3) *Horse Ponds* (from which water is pumped up to troughs).—These, if not constructed on suitable lines, give rise to much trouble.

In the large majority of cases that came under

my notice they were made by simply damming up the stream. The result was that a large shallow pool was formed, stagnant at the edges and presenting a large surface area. Such a pool obviously offers excellent opportunities for mosquito breeding (fig. 5).

The only really satisfactory plan on which to construct these, is to dig out a pit in the side of the stream (it is rarely that a spot suitable for this cannot be found), thus forming a small deep pool in connection with the main stream (fig. 6).

Ponds constructed on this latter plan were almost entirely free from mosquito breeding.

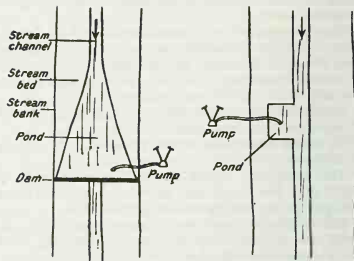


FIG. 5.

FIG. 6.

LARVICIDAL METHODS.

Petroleum.

This was thoroughly tried in the summer of 1917 and found extremely unsatisfactory.

In many cases it was found impossible, even with the greatest care, to obtain a satisfactory surface-film of oil; in others, the film was easily blown aside by wind or dispersed by frogs, &c. I did not use it at all in 1918.

Cresol.

Attention had been previously drawn to the efficacy of cresol as a larvicide by Captain Mayne, R.A.M.C., and in actual practice I found it most effective, but thorough dissipation of the solution is absolutely necessary if it is to be so.

Strength of Solution.—Acting on Captain Mayne's conclusions, 1-100,000 solution was used in standing water and 1-1,000 solution (roughly) in slow-flowing streams. The actual strength added was (roughly) 50 per cent., a stronger solution mixes with difficulty.

In dealing with gardens and horse troughs, and in pools which are wanted to act as decoy pools (see later), it is essential that the dilution should be as accurate as circumstances allow. The two following rough approximations were found exceedingly useful.

Area of a circle = $\frac{\pi}{4} D^2$ (D = diameter).

One ounce of cresol to 100 cubic feet of water gives a dilution of 1-100,000.

Effect on Animals and Plants.—Experience confirmed Mayne's conclusions. Many wells, &c., directly supplying horse troughs were kept regularly cresolized, without detriment to the animals, and no harm to vegetables resulted from cresolizing the tanks supplying gardens.

Frequency of Application.—Reasoning from the life-history of the mosquito, the cresol solution should be added at intervals of not less than 7 to 10 days.

Experience showed that as a rule larvæ would not be found in stagnant pools under a period of 10 days, and in running water under a period of 5 days.

In actual practice cresolizing was carried out twice a week.

MODES OF APPLICATION.

Pools and Ponds.—Simple stirring with a stick is sufficient to dissipate the solution in small pools and ponds.

In large pools a simple floating keel with cords on each side is satisfactory. It is portable and can easily be constructed (fig. 7). It is manipulated by two men, one on each side of the pool, who pulls it backwards and forwards.

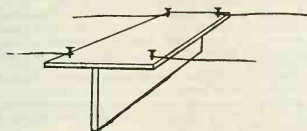


FIG. 7.

This device can be modified for use by one man, by attaching a rod to one side instead of the cords, but it is not very portable, nor so satisfactory a stirrer.

Streams.—By far the most effective method of application in streams and channels is to brush the cresol solution down the stream with a broom. This not only thoroughly dissipates the solution, but scratches up the crevices in the sides and floor of the channels where larvæ are frequently lurking.

Drip-cans.—Experience showed that cresol drip-cans were useless. The drops ran down the middle of the stream and did not mix with the water, and even when double-holed cans—one hole for each side of the channel—were used the diffusion remained very slight. The mechanical difficulty of arranging a satisfactory drip is exceedingly great and in actual practice rarely overcome. After an extensive trial they were completely given up.

Decoy Pools.—These, if carefully constructed and accurately cresolized with a 1-100,000 solution, are exceedingly effective.

This was definitely shown by the fact that while enormous numbers of egg rafts were present in them no larval development was ever found. The only difficulty is to make the pools attractive to the mosquito. With a little ingenuity this difficulty can generally be overcome, but in some instances

all devices to induce mosquitoes to oviposit were unsuccessful.

Drainage Pits.—These are used in connection with long stagnant streams whose gradient is very slight. Many such were encountered on the plain which formed part of the area, and this method of dealing with them proved by far the most satisfactory.

A series of pits are dug in the course of the stream at intervals of about 15 yards (the size of each pit and the distance between each must vary much according to the nature of the ground), and these are kept clear of weed, &c., and carefully cresolized. This greatly reduces the volume of slow-flowing water in the stream-channel, cuts short the stream a considerable distance before its natural termination and converts it, more or less, into a series of clean-cut pools.

Combined Constructional and Larvicidal Methods.—A combination of the two methods was generally used in the case of streams and pools.

Although it was definitely found that mosquito-breeding in weedy pools was very markedly decreased by the admixture of cresol without other treatment, yet the diffusion and consequent action of the cresol is greatly assisted by removing the weeds, &c.

The same holds good in the case of flowing streams. To investigate this point, several streams where the channelling was known to be inadequate were treated with cresol—considerable larval development was invariably found. After rechanneling and treatment with cresol no larvæ were found.

Special Breeding-places.—There are several places where mosquitoes are especially liable to breed and which are easily overlooked. Such are:—

- (1) Drips and overflows from fountains and troughs.
- (2) Inside horse-troughs.
- (3) Upturned tins and barrels.
- (4) Isolated horse-hoof marks.

Puddles in roads are rarely dangerous, as the ground is too frequently disturbed.

In flowing streams, larvæ were found in damp sand one inch from the edge of the water, and on more than one occasion pupæ were found under rocky ledges situated full in the course of a swiftly-flowing stream. Such breeding when noted is easily dealt with by cresol.

Radius of Areas that should be Treated.—Acting on the experimental results of the American workers in Panama, the treatment of all possible breeding-places within a radius of one mile from any inhabited place was always aimed at.

This was not always possible on account of active service conditions, but it formed an excellent rough working rule.

IMPLEMENTS FOR USE.

Sprayers.—The three types in use were: (1) Mackenzie, (2) Special Rapid, and (3) Vermorel; of these the former was by far the most satisfactory. Though two men are needed to work it, the work is always more satisfactory when it is used, and in dealing with overgrown swampy areas its length of reach renders it invaluable.

The only real drawback to the Mackenzie Sprayer is its tendency to become clogged, but this can easily be prevented by always washing it out with water after use with cresol.

The short Special Rapid Sprayer is useful, as it only needs one man to work it, but its range of dispersal is small and it easily becomes unserviceable.

The Vermorel Sprayer was found very unsatisfactory, and after a thorough trial I gave up its use completely.

Cutting Implements.—A multiplicity of these is to be avoided, and it should be a cardinal rule that they should all be short-handled.

Long-handled billhooks and such like were found to possess little or no advantage over the short-handled ones, were clumsy to handle, and very liable to break.

For cutting small bushes the ordinary spade or shovel answers admirably and sickles present no special advantages. For cutting large thick bushes, hand-axes or the ordinary short-handled bill-hooks are the best.

ANTI-MALARIAL WORKERS.

Reliability in this style of work varies directly as the workers' knowledge and intelligence, and it is therefore essential that all supervisors should be instructed not only in the practical methods of mosquito-breeding prevention, but also in the etiology of malaria and its influence on the lives of those exposed to its ravages. If the best results are to be obtained this instruction should be given to all engaged in the work.

This does not, of course, apply to gangs of native or other unskilled labour so useful for initial trenching and cutting work.

A short course of five or six lectures with practical demonstrations proved quite sufficient instruction for practical purposes.

In conclusion, the main points which I should like to emphasize are:—

(1) The reliability and effectiveness of dilute cresol as a larvicide, and its innocuousness to animals and to plants when used as suggested above.

(2) The unreliability—in the writer's hands, at least—of petroleum as a practical larvicide.

(3) The efficacy of decoy-pools if suitably constructed and supervised.

(4) The importance of trained supervisors.

Case of Viper Poisoning (S. W. Coffin, *Ind. Med. Gaz.*, June).—The treatment recommended consists of the intravenous injections of Bayliss' fluid (gum arabic, 7 parts; sodium chloride, 0.9 part; water, 92.1 parts), injection of epinephrin and the intramuscular injection of 1 grm. of calcium chloride with 20 minims of water, is not intended to supersede the administration of antivenene, which should always be injected in cases of viper poisoning, known to be due to Russell's viper or of dubious origin. The treatment should prove extremely valuable in cases of echis poisoning, there being no available antivenene for the treatment of these cases.

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THE JOURNAL OF Tropical Medicine and Hygiene

OCTOBER 1, 1919.

LUNACY IN TROPICAL COUNTRIES.

The subject of lunacy is one which is ever difficult, and the medical practitioner endeavours to get rid of the lunatics from amongst his patients as soon as possible, by sending them to an asylum; moreover, everyone regards them with hopelessness

as to cure. This is the case in Britain and most countries where State organization for the care of lunatics exists.

Our knowledge of the causes of lunacy is yet in its infancy, and its treatment has wellnigh, from the point of cure, scarcely reached the embryonic stage of development. That the subject of the ætiology of mental ailments is being seriously taken up by experts is well known, but they are a mere handful of the medical profession. Pathology has added considerably to our knowledge, but it has not advanced far as yet in elucidating any great general principles for our guidance. It is too early to expect that so intricate a subject, which has been scientifically dealt with for some thirty years only, should have given us much that is definite in either facts or figures. The physiology and even the anatomy of the brain is but now attaining something like accuracy. The information gained at post mortem examination, without exact anatomical knowledge, is little more than empirical in its usefulness and lacks the basis of scientific precision.

However, advance is being made in more directions than one. We can say truthfully that the anatomy of the brain has advanced, so has the physiology of the cerebro-spinal system, in spite of the opposition of the anti-vivisectionists, who would smother science in these Islands without compunction, who would with their profession of being "unco-guid" consign scientific investigation to the nether regions because of its attempts to learn the truth and to ascertain the means of alleviating human suffering and the cure of diseases which beset dumb animals. These are the Bolsheviks of science who spread their pamphlets with as ghoulish a purpose as ever entered the perverted brains of the ignorant Russians who are now deluging their country with blood in their "humane" purpose of benefiting mankind. Perish science, let the men, women and children die of their ailments and the dumb creatures continue to suffer rather than their fad should fall flat. The real humanitarian is the man or woman who would show us how to alleviate suffering and not that of the hare-brained chatterers who preach a mock humanity.

In yet another way has the ætiology of mental diseases been elucidated besides by anatomy, physiology and post mortem examination. During recent years the disease pellagra has been prominently before us. This disease fills the lunatic asylums in all countries where it prevails and may prove to be a starting point in the study of brain troubles of wide import. Unfortunately the ætiology of pellagra itself is not settled; most observers holding it to be due to infection conveyed by maize, whilst others follow Sambon's contention that it is due to infection conveyed by a simuliæ, a fly in fact, and, moreover, by flies of different species. Yet even allowing that the matter is not settled we have before us an ailment first showing evidence with fever and a skin affection gradually

leading on to insanity. By this fact a new field is opened up; the fact that insanity shows clinical signs and symptoms of a definite nature is a great step of encouragement in what heretofore has been regarded as a hopeless study. The lunatic asylums of Italy are largely, if not chiefly, occupied by persons who have had the clinical and skin lesions which characterize pellagra. Prevent this disease, whether by withholding maize from the diet or preventing infection by protecting the individual against being bitten by the fly by destroying its breeding ground, and the asylums in Italy would be emptied of wellnigh half their inmates. From the United States we learn a lesson in much the same direction. It is but a few years ago since pellagra was unknown in the U.S.A., but the spread of the disease has assumed enormous proportions, at least 100,000 cases being reported, and with this increase the lunatic asylums have been filled to excess in the States where pellagra is met with. It is but a few years ago since we knew that we had pellagra in Britain, but Sambon, in his visit to a number of lunatic asylums, found evidence of pellagra amongst the inmates. Of course this discovery places the possibility of pellagra being due to maize eating wellnigh outside the bounds of reasoning. The opposite is the case in America where maize is largely consumed, and the association between eating of maize, pellagra, and the ultimate lunacy it causes, is fostered thereby.

Be that as it may, however, the fact remains that an infection of some severe sort develops a disease of well-marked signs and symptoms which wellnigh invariably ends in lunacy. The fact is, a stimulus to the study of lunacy has been given which it is hoped will not be allowed to be lost sight of; and it is hoped that further investigation may be made in the same direction, not necessarily in regard to pellagra and maize eating but in a much wider field, for, if it is maize that is guilty, then may other foodstuffs have their influence in causing mental aberration. And of the many groups and forms of lunacy further light may be thrown upon the effect of food, or of infection otherwise conveyed, by a closer study than has been, hitherto, the case.

In tropical reports we read of lunatic asylums, both European and native. That the inmates are fed and housed we have no doubt, and that they are unkindly treated we have no right to assume, nor have we anything to cause us to suspect they are. But as regards the nature of their brain affection, the probable etiology and what treatment, if any, is adopted is another matter. We find little enough said about that in our European asylums; but with the well trained observers which we are now sending to the tropics we expect better things. They gave us a new branch of medicine and have reached a proficiency in investigation which is not possessed by the bulk of the medical profession in Europe. So far, however, we cannot find that anyone in the tropics has dealt with this branch of medicine. In our

tropical schools in London and Liverpool there is no teaching on the subject, and we know that in our ordinary medical schools the teaching is medico-legal rather than clinical or ætiological.

In the tropics, however, a vast field for investigation is to hand, unexploited and untrodden. As Sambon found pellagra in the lunatic asylums in Britain, an ailment hitherto unrecognized and unsuspected, so may the tropical observer find this or other ailments associated with brain trouble which would add to our present knowledge, and help to raise the subject of lunacy out of the chaos in which we find it as regards cause and treatment.

Time is the enemy; for in tropical countries doctors have few leisure moments, and amongst the able men in the colonial service whose time can be apportioned with better chance of regularity than is that of the general practitioner some may be found with a bent towards investigation in this important branch of medicine.

Investigation of food-caused disease is before us, and has been answered on more than one occasion in the positive. Polished rice and beriberi are determinedly associated; scurvy and absence of fresh juice of meat, fruit or vegetables, famine fever, ergotism, annually recurring febrile and eruptive signs and symptoms from plant contagions, an imitation of hay fever in Europe, are a few examples of ailments associated with plant life, which may, and in some cases have been shown to be associated with mental disorders of a more or less permanent type.

An investigation of this kind means long and plodding work almost incompatible with the routine of practice and the earning of a livelihood. But if everyone contributed even a small quota from time to time the evidence would in time accumulate and justify Government helping in the matter, and gradually founding a department, however small, whose duty it would be to give a scientific direction to the investigation of brain ailments amongst natives in various countries.

Annotations.

Mental Diseases in Japan (S. Kure and G. Kashida).—In Japan the majority of persons suffering from mental disorders are treated at home. In all 140,000 mental defectives are reported in Japan. Of these fully 80 per cent. of the patients are men; only 4 per cent. are provided for at State expense, the families of the remainder being responsible for their care and keeping. The better class of people furnished 12 per cent. of the cases; the middle class, 37 per cent.; and the poorer classes 51 per cent., of which more than half were from the very lowest grade of society. The farmer class furnished 65 per cent. of the patients. Without exception these persons had committed some act of violence or other violation of the criminal code and were confined for that reason. Nearly 60 per cent. had been confined for at least five years, many over fifteen years.

Dementia præcox was the commonest form of mental derangement, followed by dementia paralytica, manic-depressive states, idiocy, &c. There is no mention made of the part taken in the ætiology of these cases by syphilitic infection.

The rooms in which these unfortunates are confined are generally small. A fourth of the rooms are integral parts of the houses; another fourth are connected with barns, and the remainder are more or less disconnected from the main buildings or are located in a nearby field. The whole aspect is one of misery and desolation, and the circumstances are such as to prevent absolutely the recovery of any person so confined. Food, clothing, bedding, and the necessities of life are most sparingly supplied, and baths are very infrequent. A mentally defective person is considered by his family as lost to them, and as long as he lives he is a burden to all concerned. The treatment is probably not intentionally cruel but is rather that of neglect. Many of these cases might be improved under better treatment; what is needed is more enlightenment of the people as to the nature of mental maladies.

Antiscorbutics (*Journ. Amer. Med. Assoc.*, August 2, 1919).—The loss of antiscorbutic potency as the result of desiccation and cooking demonstrated at Yale with regard to cabbage and potatoes has been substantiated at the Lister Institute in London. There is a loss in antiscorbutic properties of more than 93 per cent. when cabbage is dried at a low temperature and stored subsequently for from two to three weeks. After drying and storing for from five to six weeks a further loss of antiscorbutic properties is suffered. After storage for three months, nearly all the protective value of the fresh material is lost (about 96 or 97 per cent.) The fact that less loss through desiccation takes place if the product is first steamed or plunged into boiling water suggests at once that something other than mere heating or desiccation is concerned in the deteriorating influences of these preservation processes.

The least loss of antiscorbutic properties is obtained by cooking green vegetables for a short time at a higher temperature rather than for a longer time at a lower temperature. Carrots lose much or all of their antiscorbutic potency through cooking. An added factor is the maturity of the plant. From a nutritional standpoint carrots cannot be looked on as a uniform article of diet. There is a marked difference in various lots of carrots, and probably also of other vegetables, according to whether they are fresh and young, or are old. If, instead of employing the carrots which were ordinarily fed to animals, the same amount of fresh young carrots, plucked only a few days previously and cooked, not only do the animals not develop scurvy, but they gain steadily in weight for a long period.

The freshness and age of the vegetables sufficed also to enable them to retain their antiscorbutic potency after dehydration. This is of considerable importance because it points to a further variable that may need to be considered in evaluating food preparations from

the standpoint of their antiscorbutic effects. If, to the problem of the effect of heat, oxidation, preliminary treatment and age of the fresh product, there is added the question as to the possible influence of different reactions—of acid and alkali as they occur naturally in foods or are added incidentally to their manipulation—the complexity of the project of retaining the antiscorbutic potency becomes more apparent.

This is a time for cultivating the "open mind" in reference to the true nutritive value of conserved foods. If some desiccated vegetables have proved to be devoid of antiscorbutic efficiency, it must, nevertheless, be admitted that the loss can probably be averted entirely or partially when the conditions which determine it are definitely ascertained. Fruit juices have already been concentrated, and tomatoes have already been dehydrated without becoming impotent in respect to the factor under discussion. It would be an error to infer from such experiments as are now on record that milk necessarily loses its antiscorbutic potency when it is reduced to a dry state. Enough specific instances of contradictory facts are on record to warn us, on the one hand, against condemning canned goods or dehydrated vegetables or their analogues from the standpoint of their vitaminic potency; or of praising any of them without specific information as to each product. The offband statements which are beginning to emanate from partizan or inadequately informed sources must not be accepted. The time is not yet ripe for "expert opinions" that are all comprehensive in their information. Knowledge in relation to vitamins is in the making. Fortunately, at the point where chemical analysis utterly fails, the physiologic experiment is proving to be a dependable guide.

Abstract.

YELLOW FEVER.¹

By HIDEYO NOGUCHI.

By injecting into guinea-pigs the blood of yellow fever cases occurring in Guayaquil a group of symptoms and lesions closely resembling those observed in human yellow fever were induced in a limited number of instances. Of seventy-four guinea-pigs inoculated with specimens of blood from twenty-seven cases of yellow fever, eight, representing six cases, came down with the symptoms; namely, a marked rise of temperature after a period of incubation averaging three to six days, with simultaneous suffusion of the capillaries, particularly of the conjunctivæ and soles, then preliminary hyperleucocytosis followed by progressive leucopenia, the early appearance of albumin and casts in the urine, which gradually diminishes in volume as the disease progresses. The fever lasts only a few days, rapidly dropping first to the normal and then usually to subnormal. At this period jaundice manifests it-

self in varying degrees of intensity, first in the scleræ, then in the skin and the urine. Hemorrhages from the nasal or gingival mucosa or anus have been observed to occur during this period. Autopsies reveal deep jaundice throughout the entire tissue. The liver is fatty and yellow, the kidney hyperæmic, and often swollen and hemorrhagic. Hemorrhagic spots were almost always found in the lungs and gastrointestinal mucosa. Guinea-pigs are usually rather sensitive to the infection, though many appeared to be somewhat resistant and some even refractory.

The injection of the yellow fever blood into ringtail monkeys, rabbits, cats, guatusas, weasels, and sloths among the mammals, and pigeons, ground-doves, bluebirds, mantas, blackbirds, parakeets, reedbirds, blancos, and toucans among the birds, gave negative results.

In the blood, liver, and kidneys of the guinea-pigs experimentally infected with the blood of yellow fever patients a minute organism was demonstrated which closely resembles in morphology the causative agent of infectious jaundice (*Leptospira icterohæmorrhagie*).

The leptospira transmitted from yellow fever cases to guinea-pigs was found to induce similar symptoms and lesions upon further passage into normal guinea-pigs.

The leptospira obtained from cases of yellow fever has been given the provisional name of *Leptospira icteroides*.

Studies are reported on the type of disease induced in guinea-pigs, dogs, and monkeys by inoculating them (1) with the blood or organ emulsions of guinea-pigs or other susceptible animals experimentally infected with *L. icteroides*, and (2) with a pure culture of the organism. Particular attention has been given in these experiments to the clinical features of the experimental infection in the various animals and to the pathological changes resulting from the infection.

The symptoms and pathological lesions induced in guinea-pigs are much more pronounced than those observed in dogs or marmosets. The period of incubation is nearly the same in all three species, seventy-two to ninety-six hours with intraperitoneal or subcutaneous inoculation, and a day or more longer when the infection is induced per cutaneously or per os. The febrile reaction in the guinea-pig and marmoset is about the same; in the dog there is less fever. The amount of albumin, casts, and bile pigments in the urine is more abundant in the guinea-pig and marmoset than in the dog, and these animals also appear on the whole to become more intensely icteric. The black or bilious vomit, however, though occurring frequently in dogs during life, is observed in the guinea-pig and marmoset at autopsy. The hemorrhagic diathesis is most pronounced in guinea-pigs, less so in marmosets, and least in dogs. In dogs, for example, subcutaneous hemorrhages almost never occur and the lungs usually show only a few minute ecchymoses. The pleuræ, pericardium, and other serous surfaces of

¹ Abstracted from the *Journal of Experimental Medicine*, June.

the thorax and abdomen remain free from ecchymoses, which, however, with hyperæmia, are very marked along the gastrointestinal tract.

The symptoms and lesions observed in animals experimentally infected with *L. icteroides* closely parallel those of human yellow fever.

The pathological changes occurring in human cases of yellow fever are similar to those induced by inoculation in guinea-pigs and marmosets and in respect to their intensity stand intermediate between those arising in the two animals mentioned.

THE RELATION OF FORAGE POISONING TO BOTULISM.¹

MEAT and meat products are by no means the exclusive, if even the main, source of the poison, which may occur also in canned vegetables and fruits, being produced by the growth of the anaerobic *Bacillus botulinus*. The normal habitat of this bacillus is not known, and the exact manner in which vegetables and other food substances become contaminated is still a mystery. Botulism is not limited to human beings; it is a frequent cause of so-called limber-neck in the domestic fowl, and it may be responsible for certain forms of paralysis in various domestic animals. The toxic agent, which is a true toxin in the strict immunologic sense and consequently neutralizable by specific antitoxin, appears to have a rather wide range of action, and is peculiar in that it resists digestion and is absorbed from the digestive tract.

It has been suggested that the occurrence of limber-neck in fowls eating refuse from the kitchen may prove of great diagnostic value in cases of suspected poisoning of human beings. The most recent development in connection with botulism is the demonstration that, in certain instances at least, outbreaks of so-called forage poisoning ("epidemic meningitis," "staggers," &c.) in horses and mules are in reality due to the toxins of *B. botulinus* or of very closely related bacilli. As long ago as 1901 the clinical analogy between forage poisoning in domestic animals and botulism in man was pointed out, and more recently actual botulism seems to have been produced experimentally in horses and in donkeys. In connection with a sporadic outbreak of forage poisoning from oat hay, a bacillus was found like *B. botulinus* in growth, form and action in animals. Botulinus antitoxin—the serum of goats, sheep or cattle immunized with *B. botulinus* and its products—protected horses, mules and guinea-pigs against the forage bacillus and against sterile filtrates of both cultures of this bacillus which otherwise would produce symptoms that were indistinguishable from those produced by the typical botulinus bacillus. This goes far to establish definitely that anaerobic bacilli like *B. botulinus* may cause the condition known as forage poisoning. In another outbreak a similar bacillus was found in the incriminated corn ensilage. In this case, antitoxin serum aggluti-

nated the ensilage bacillus and protected animals when injected with the bacillus in otherwise fatal doses, while the serum of animals immunized with the ensilage bacillus, in its turn, had agglutinative and protective effects with respect to the typical botulinus bacillus.

Close comparative studies of the different strains of these toxin-producing bacilli from different sources do not seem to have been made as yet; but the fact that they appear to be susceptible to the actions of the same immune serums indicates clearly a very close relationship if not complete identity. The symptoms of poisoning in horses and other animals strongly resemble those of botulism. After a variable incubation period the animals develop a general depression, progressive muscular weakness, incoordination, paresis of the pharyngeal and intestinal walls, impairment of vision, and ptalism. The only apparent real difference from the symptoms of botulism is that in man there is, as a rule, extreme dryness of the mouth, pharynx and nose; occasionally, however, the amount of saliva is increased. Many questions are still unsolved: the mechanism of the production of the symptoms and how the toxin causes paralysis, impaired vision, &c., are as obscure as ever: the lesions, particularly in horses and other animals, have not been studied thoroughly; and the preventive and curative value of specific antitoxic serum in man and in animals remains to be determined. It is of special interest that in a desperate case of botulism recovery followed the injection of antitoxin serum. The free use of such serum in cases of botulism is a perfectly logical procedure warranted by the unequivocal results of experiments. For the present antitoxin serum is not yet an article of commerce. The serum should be used early in suspicious food poisoning, as then it should be entirely possible to prevent such tragedies as are recorded. The hope arises that the demonstration of the relationship of forage poisoning to botulism may result in available supplies of potent antitoxin serum for man and beast.

Vaccines in Cholera Prophylaxis (A. Roy, Ind. Med. Gaz., June).—Roy says that vaccination against cholera has been proved to be so highly efficacious in the army and labour corps as to warrant its extensive use as a prophylactic measure among the civil population during an epidemic, or when cholera is likely to break out. It has been found efficacious in the Japanese epidemic of 1902, in the Russian epidemic of 1908-1909 and in the tea districts in Assam. In the recent war, the beneficial effect of prophylactic inoculation has been proved. The new cholera vaccine of Kasauli is the result of various experiments done from time to time. It combines the efficiency of Haffkine's vaccine with no local or general reaction at all. It consists of a pure, sterilized culture of cholera spirillum absolutely free from any reaction (local or general), and can safely be injected into people of both sexes, of all ages, including infants, and in all stages of health, including pregnant and recently delivered women.

¹ Abstracted from *Journ. Amer. Med. Assoc.*, August 23, 1919.

Original Communications.

INSANITARY SNAILS AT DURBAN DURING THE WINTER MONTHS.

By F. G. CAWSTON, M D.Cantab.

In July, 1919, I collected 227 fresh-water snails from the semi-stagnant pools at Sydenham, one of the Durban suburbs where a large number of Indian children who bathe and paddle in them during the summer harbour the bilharzia parasite and resist the usual methods of medical treatment.

Nearly all the specimens were fully developed, and some were larger than I have seen in other parts of Natal. There were about twenty-five *Limnæa natalensis* and 202 *Physopsis africana*. The former were particularly fine specimens.

Ninety-six physopsis were free from cercarial infection.

Fourteen physopsis harboured leptocercariæ of various kinds, including *C. catenata*, and one with a well-defined pharynx.

Thirty-two physopsis harboured cercariæ with forked tails. In each case the liver-substance was lighter than normal and somewhat greyish in appearance.

C. spinosa.

In some of the infested specimens these Schistosomes were better developed than in others, and presumably had reached maturity. In several specimens there was no appearance either of sporocyst or redia-formation, the cercariæ appearing to lie free in the liver-substance. In no case was redia-formation encountered. None of these Schistosomes reached more than half a millimetre in total length, the relative lengths of the body, tail and prongs being at the rate of 2, 3 and 1. The prongs of the divided tail had a strong tendency to curl over towards the tail. The internal organs of the cercariæ were not easy to define, though the ventral sucker at the junction of the middle and posterior thirds of the body was clearly visible and the gut divided into two just anterior to it.

Around the oral orifice, under the high power of the microscope could be readily seen a circle of sharp spines, curved outwards like horns and about twelve in number. There is little doubt that these spinous processes enable the cercariæ to penetrate the skin of man or beast. I have never encountered them in leptocercariæ and encysting forms, and it is probable that cercariæ which encyst and are swallowed by the mouth do not possess them. These spines would enable a cercaria, not only to penetrate the mucons lining of the mouth and stomach, but also the skin of various parts of the body.

Dr. Iturbe of Venezuela has reported that, in submitting laboratory animals to infection with *Schistosomum mansoni*, the infection took place rapidly, requiring a minimum of five minutes contact with water containing the free swimming cercariæ for the contagion to be produced. With

white rats infection was always produced with the greatest ease, the cercariæ penetrating the skin of these animals, often in the region of hair follicles.

In his report of the cercariæ from physopsis at Nijlstrom, with which Dr. J. G. Becker successfully inoculated a guinea-pig at the South African Institute for Medical Research, Dr. Becker makes no mention of boring processes or spines around the oral sucker. He states that a fully extended cercaria measured approximately 0.5 mm. in total length when fully extended. The cercariæ from Sydenham differ from these, however, in the narrow and curled appearance of the prongs of their divided tail, the prongs of the tail of *S. hæmatobium* being flat and fin-like.

At the Congress of the S.A. Association for the Advancement of Science, held at East London in July, I pointed out that some of these cercariæ developed in rediæ, whilst others developed in sporocysts without the formation of rediæ, and that evidence was accumulating in support of the view that, although furcocercariæ had been reported as developing in rediæ, *S. mansoni*, *S. hæmatobium* and *S. japonicum* all developed from sporocysts without the formation of true rediæ.

Microscopic examination of the limnæe obtained from the pool at Sydenham supported my contention that *P. africana* alone is responsible for bilharzia disease amongst human beings in South Africa. Thirteen specimens were free from cercarial infection. None harboured any furcocercariæ; but nine were infested with large rediæ, $\frac{3}{4}$ of an inch in length, containing heavily pigmented cercariæ, *C. pigmentosa*, a cercaria which was a full millimetre in length and readily encysted on the microscopic slide. From its course of development and appearance, this cercaria which infests *L. natalensis* resembles the liver-fluke.

SOUTH AFRICAN CERCARIÆ.

A study of the described cercariæ of South African rivers shows that they are all distome or amphistome larvæ. There are several distinct species of furcocercous cercariæ and possibly a few microcercous forms. Eye-spots occur in some of the leptocercous and furcocercous varieties. Without exception the larval hosts are fresh-water molluscs.

The occurrence of two cercariæ species in the same host individual is not uncommon. On several occasions the writer has found two distinct furcocercous forms in the same mollusc; on other occasions, the same individual snail was found infested with both leptocercous and furcocercous cercariæ.

HEAVY INFESTATION.

There is a distinct increase in fluke-infested molluscs at certain seasons of the year. The molluscs most heavily infested are *Planorbis pfeifferi*, *L. natalensis*, *P. africana* and *Isidra schakoi*. The heavy infection of planorbis and limnæa is caused by distomes, that of isidra by amphistomes, and that of physopsis by Schistosomes.

In January last I was keeping in a small vessel of water a snail, *P. africana*, which was heavily infested with furcocercariae. Within an hour after the snail was placed in the vessel, the surrounding water was seen by the naked eye to be swarming with an incredible number of cercariae.

I placed a small piece of skin and mucous membrane in a drop of water containing seventeen freely-swimming parasites on a glass slide, and was able to watch the behaviour of the cercariae through a low-power lens. In ten minutes three cercariae had swum to the mucous membrane and two were moving round the skin. There was no sign of them wishing to penetrate either. Two cercariae were noticed slowly drinking the secretion round the mucous membrane; this they did by stretching out their bodies and opening their oral sucker to its full extent, and then contracting their bodies and partly closing their oral suckers, as though in the act of swallowing. They kept up this movement for about five minutes. Five hours later the cercariae were still freely swimming about. Twenty-four hours later all were seen to be dead in the water away from skin or mucous membrane, and half of them had shed their tails. A number were injected by Captain Murray, S.A.M.C., into a guinea-pig intraperitoneally without effect.

CONCLUSIONS.

Among the snails which infest these pools in the Durban suburbs is a large proportion of bilharzia's intermediary host.

At this time of the year *Schistosomum hæmatobium* is probably entirely absent.

There is, however, a fairly heavy infection with a *Schistosoma* which infests physopsis in the neighbouring pools at Toll Gate and on the Umhlanga river at Ottawa, North Coast. These *Schistosomes* are similar in size to *S. hæmatobium* as met with in South Africa, and are about the same size as *S. mansoni* in Venezuela which Dr. Iturbe describes as being:—

Body length	from 0.100 to 0.130 mm.
„ width „	0.040 to 0.050 „
Tail length „	0.140 to 0.150 „
„ width „	0.020 to 0.025 „
Prong length „	0.040 to 0.050 „
Total length	about 0.330 mm.

These pools are frequented by horses and contain fish. The *Schistosomes* probably attack one or other of these.

The encysting cercaria is probably one which attacks an animal which feeds on grass, such as the horse or mule.

The presence of *Schistosomes* and the heavy proportion of the species of snail they infest, indicates the need for eradicating this pest which abound on the rushes and water-lilies of these pools and emphasizes the desirability of constructing more bore-holes or rain-tanks which alone should be used to store water for drinking and washing purposes. And, amongst the more aggressive

Indians of this suburb, these bore-holes are becoming increasingly popular.

Before we can feel any certainty about the matter of bilharzia in Natal, it is essential that successful injections could be made at will. We are not on solid ground until this can be done.

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DIPLOCCERCOMONAS SOUDANENSIS.

By ALBERT J. CHALMERS, M.D., F.R.C.S., D.P.H.,

Director, Wellcome Tropical Research Laboratories,

AND

WILHELM PEKKOLA,

Wellcome Tropical Research Laboratories,
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IN the JOURNAL OF TROPICAL MEDICINE AND HYGIENE for February 15, we published a note upon a new flagellate belonging to the family *Tetramitidae* sub-family *Embadomonadinae* which we called by the generic name *Dicercomonas* to distinguish it from, and at the same time to show its close relationship with, Wenyon and O'Connor's genus *Tricercomonas*.

We regret to say that the fact that the name had been used before completely slipped our memories until Dr. Hassall kindly drew our attention to this fact.

It appears that *Dicercomonas* was introduced by Dising in 1865 in his "Revision der Prohelminthen" for *Monas succisa* Perty 1852 which may, or may not, be the same as *Hexamita inflata* Dujardin 1841, as Dising described it as caudate and with one flagellum.

The term was again used by Grassi in 1879, and this new genus was subdivided into *Monomorphus* which is a synonym of *Hexamita* and *Dimorphus* which is a synonym of *Giardia*. As the name *Dicercomonas* has been used already we should not have employed it, and therefore we take this opportunity of altering the name of our parasite to *Diploccercomonas soudanensis*.

The name *Diploccercomonas* does not appear to have been employed before as far as we can ascertain from the literature available in Khartoum.

As it has been suggested that possibly we missed a third anterior flagellum, which might be very faintly stained, we have submitted our specimens to Major Archibald, D.S.O., M.D., R.A.M.C., who is a well-known worker in parasitic protozoa, and we have his authority to state that he can find no trace of any such flagellum therein.

We beg to acknowledge the kindnesses which we have received from Dr. Hassall and Major Archibald with regard to this matter.

QUININE METRORRHAGIA.

By ALBERT J. CHALMERS, M.D., F.R.C.S., D.P.H.,

Director, Wellcome Tropical Research Laboratories,

AND

Major R. G. ARCHIBALD, D.S.O., M.D., R.A.M.C.,

Asst. Director, Wellcome Tropical Research Laboratories,
Khartoum.

WE have recently met with a case of marked metrorrhagia in a native girl of good family. After excluding all other possibilities by careful clinical, chemical, microscopical and bacteriological examinations, we came to the conclusion that in all possibility the hæmorrhage was due to the bihydrochloride of quinine which she had been taking in tabloid form for several months as a prophylactic measure against malaria.

We stopped the quinine and after a short interval we placed her on calcium lactate in ten-grain doses twice daily. The metrorrhagia which had been going on for several months quickly ceased. There was, however, a slight recurrence with the next menstrual period, but this was quickly controlled by about a couple of doses of the same mixture.

Some eight or nine months have rolled by since the last treatment of this patient, and during the interval she has kept quite well.

We would venture to suggest that this line of treatment might be useful for controlling the menorrhagia of the tropics when excessive.

Inherited and Familial Exophthalmic Goitre (Souques and Lermoyez, *Revue Neurologique*, xvi, No. 1).—In the family described there have been seven cases of exophthalmic goitre among the sixteen members of the family in three generations. The tendency seemed to be transmitted by the males. There were no signs of inherited syphilis; the trouble must be some inherited predisposition rendering the thyroid peculiarly susceptible to diverse infections and intoxications. They list the few similar familial cases on record. In one, dating from 1884, eleven of the sixteen members of the family had developed exophthalmic goitre.

Dysentery and Œdema (J. F. Martin and A. Debarb, *Lyon Médical*, June, 1919, 6).—Five cases of dysentery had ascites, effusions in joints or œdema in the legs, all without any signs of nephritis. All but one young man were about 40 years old, and the œdema appeared during convalescence. It lasted from one to ten weeks. Only four other recent cases have been published, but older writers mentioned dropsy as comparatively common with dysentery. In the five cases described here, the œdema was accompanied by polyuria and the urine contained large amounts of chlorides, from 23 to 36 gm. instead of the normal average of 10 or 12 gm. The salt content of the blood was low, from 5.38 to 5.96 per thousand, instead of the normal 6.75.

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LEAVE, LEISURE AND AFTER.

DOCTORS WORK AT HOME AFTER RETIRING FROM THE TROPICS.

THE question of leave is ever a burning one to all Europeans engaged in work abroad, and in the tropics more especially. To the sailor, the soldier,

the manager of the bank, and the heads of firms, as well as the staff under them, the matter is one which keenly affects them, and forms a large part of their thoughts and conversation. The subject of leave has to be dealt with by every business manager, for there must be always a certain number at home on leave, thereby necessitating a surplus staff over and above the actual number of "desks" in their offices. No one is exempt from this worrying question; the doctor, the lawyer and the clergy have each this recurring troublesome time to consider, and as they may be single-handed or have but one partner or substitute to fall back upon it often affects them seriously. One man at home when but two are at work together means double work for him who is left in charge, and in the case of a doctor especially it is fraught with anxiety. One man away, on the fitness of the doctor at work abroad much responsibility rests; the extra work, especially should an epidemic occur in his practice, may prove so heavy that a breakdown is always in sight, and a calamitous state of things results, bringing about a serious condition of affairs in the community he practises amongst; as an example, the writer's experience in this direction will prove interesting. In the distant island where he practised four doctors were engaged in private civil practice; of these one went home on leave for twelve months, one shortly afterwards died of malarial hyperpyrexia, and the third man was ill or confined to his house for a spell, varying at times from one week to four weeks on end. The whole of the work in the island fell upon the one doctor left, and during the period when thus situated a sharp epidemic of cholera occurred.

The writer happened to be the one left to carry on, and neither by night nor day was any rest available. For three months he never was a whole night in bed, and for some days and nights together he never had off his clothes. This too in a tropical climate during the most trying time of the year. The ordinary ailments had to be attended to, midwifery work happened to be excessive, and to these the addition of a scare of cholera, rendering people anxious and nervous, added fifty-fold to the daily routine of a busy practice. Add anxiety to the physical endurance required, for there was no consultative help available, and the position can perhaps be realized. The need for physical fitness on the doctor's part was keenly brought home to one, for even, although he happened to be of herculean strength, he was bound to flag, and the community suffer in consequence. The way out of such a state of affairs it is difficult to see. The island was situated well-nigh 10,000 miles from Britain, so that immediate help was unobtainable. The situation was no doubt exceptional, but its recurrence is by no means impossible in several parts of our distant tropical colonies and protectorates, and provision has to be made for it in connection with settling the number of doctors engaged in practice in a tropical country. An extra member over and

above the actual number required to be at work at one time must be provided for, and this means lessened profits to divide and a lowering of income to all concerned. As in business circles extra men have to be employed owing to leave being granted, so in medical practice the same thing has to be met and acted upon. We usually divide leave under two categories, ordinary leave and sick leave, but the two are well-nigh identical, for ordinary leave differs but little from sick leave, inasmuch as the former is as much a necessity as the latter. A delayed holiday leave, as a rule, ends in sickness to the person delayed, for change is imperative at timely and fairly regular intervals if health and fitness is to be maintained, and in the doctor's case perhaps more than in any other calling.

The consequence of these lessons in arranging for leave and sickness has resulted in doctors, where the community is fairly large, joining together in partnership of two, three, four, or even more in number, thereby lessening the anxiety and the excessive work thrown upon any one individual as was heretofore the case. It is a wise preventive measure, inasmuch as so-called ordinary leave is rendered possible and a breakdown from exhaustion less likely to occur.

Leisure after an active life in a tropical country is seldom fraught with that halcyon time that seemed to loom before the toiler under a tropical sun. Retiring at an age which amongst those engaged in home pursuits is unusual, he seeks to interest himself in sport and recreations of varied sorts, and in this way his time is pleasantly spent for a period. By and bye, however, all play ceases to attract and restlessness ensues, with a feeling of desire for useful occupation. One may take to fruit growing, chicken farming and the like. This soon involves him in worry and usually loss of money, at least to begin with, and with so much capital involved in the concern with but little evidence of adequate return, the anticipated pleasure is replaced by disappointment and regrets. A desire to cut the loss and give up the whole thing supervenes, and this line of occupation is rendered null and void. Others are content to spend their days in gardening, a calling which they had never before taken up; in this also they find skill is necessary, and by and bye the gardening is left to a gardener, and all immediate interest is forfeited. Many bankers and others get seats on boards of directors, and drift through life with easy spells of work to "occupy" the time. It is but seldom an old tropical hand takes up any real professional or business life. The doctor who has retired from practice abroad with a competency at, say, forty-five, may, and often does, begin life all over again by buying a general practice at home, resolved to confine himself to a limited amount of work, and almost invariably ends in giving up his practice; or he may be content to plunge into the busy life of a general practitioner, and continue thereat until old age approaches. This is perhaps the best solution of the problem of a doctor's work who retires from

the tropics in the late forties of his life. He is raised above the worries of the ordinary doctor as he has a competency behind him, and he is engaged in useful work, and work which is his natural calling. Some start as specialists, but unless the speciality is eyes, or throat or ears, it is but seldom that success follows. The specialist in general tropical ailments may get his old patients from abroad to consult him, but he loses touch with the old place, for the European population abroad is ever changing, and he is unknown except in name to the new arrivals, and his practice at home dwindles after a few years as the source of supply falls away. At first it seems promising, those home from the place he practised in abroad come to him, and all seems well; but the third year is the trying time. Old friends and patients become fewer as they leave the tropical locality they resided in, and other places have not yet contributed their share, for it takes time for a reputation to spread. The old tropical hands resident in Britain do not get tropical ailments as years go on, and they are content with the local practitioners to look after their digestive, bronchial and other troubles.

The fact is that London, and London only, seems to satisfy old tropical residents for a time at least. They have been out of the "hub" for so long that they, be they English, Scottish, Irish or Welsh, all look to London as their centre, and must settle in or near the metropolis. By and bye London ceases to attract, and they scatter and spread farther afield.

All doctors also with tropical experience seem to think London is the place for them to settle in. They will no more take up the drudgery of general practices, and being specialists in tropical ailments they settle where persons suffering from these complaints gather. Thus London becomes overstocked. Few ever think of going elsewhere, namely, to British spas where folks with "liver" congregate, and as the tropics are always considered to be the genesis of the evils of that organ they naturally flock thither. There they hand themselves over to a "spa doctor" who may never have left British shores, and they get purgings, douches, massage, and baths of all sorts, electric and dietetic treatment of elaborate kinds. These may prove beneficial and efficacious, but in other instances the opposite obtains. Why have not each of our spas a tropical expert to whom those suffering from tropical troubles may go, or be sent there by those practising in London? The writer has often attempted to settle doctors home from abroad at these spas. In only one instance has he been successful in doing so with the happiest of results to the doctor himself and to those suffering from tropical ailments. Why other men will not go to these spas where their success is assured is incomprehensible. The call of London is the hindrance.

A doctor in the fifties with a fair competence will find profitable occupation for well-nigh six months in the year at a British spa. A year or two's probationary trial must be gone through—

that is, until such times as his presence at the spa is known, when a consulting practice is bound to develop and extend. Many British spas are nowadays superior in every way to any continental spa known, and were a tropical specialist to be at hand, Carlsbad and other resorts would be neglected for home spas to the benefit of doctor and patient.

Annotations.

Human Rabies (J. C. Regan and A. Silkman, *Archives of Diagnosis*, April, 1919).—The best method of treating bites of suspected rabid animals is by cauterization with nitric acid, which by virtue of its power of diffusibility and penetration may destroy the virus in cases in which other chemicals would have no effect. It is especially valuable in the cauterization of bites treated late. It produces little scarring, and the resultant wound heals well. It is the caustic that should always be employed. To get the utmost effect the nitric acid must be "fuming." The wound should be cauterized as soon after the bite as possible, even up to the seventy-second hour after the accident. Previous to cauterization the wound should be squeezed to encourage bleeding, and it should be thoroughly washed with mercuric chlorid solution (1:1,000). A wet dressing of this should be applied after the cautery has been used. If the wound is a punctured one and cannot be cauterized properly, it should be laid open with a scalpel to allow proper treatment. A bite should not be sewed up. If sutures have been introduced before the patient appears for treatment they should be removed and cauterization should be performed. The method of preparing the Pasteur vaccine and the scheme and method of administering it, as followed in the health department's antirabic clinics, is briefly outlined. For ordinary bites nothing stronger than a three-day cord is used. For face bites and extensively deep wounds two-day cords are employed. If the patient has been bitten by a positively rabid animal it is a practice to advise him to return for a second series of injections after the expiration of six months. This will avoid those rare instances of death when the particular virus concerned has a prolonged incubation period. In the case of face bites or very extensive wounds the entire course of treatment should be repeated two weeks after the completion of the first. Publicity and the institution of proper laws are essential for the eradication of the disease. That this ideal condition is attainable, the experience of other nations has shown. Importation of dogs should be regulated, all stray animals should be impounded, all dogs licensed and supervised. Among the important measures comprised in this supervision is the use of a proper muzzle for dogs in all public places under the penalty of destruction of the dog.

Malaria Infection and Control (C. C. Bass, *American Society for Clinical Investigation*, June 14.)—Malaria infection without recognized symptoms occur more

frequently than recognized attacks in an area of great prevalence. A malaria survey was made of 31,459 persons, practically everybody living in an area of 328 square miles in Bolivar County, Miss., is representative of the most heavily infected section of the United States. Of the 31,459 persons included in the malaria survey, 40'30 per cent. gave positive histories. Blood examination of these revealed malaria parasites in 28'96 per cent. There were 59'70 per cent. who gave negative histories. Of these, 15'93 per cent. were found positive on blood examination. History of attacks alone cannot be depended on to indicate the presence of malaria infection. It indicates only 55'09 per cent. of the existing infection.

Treatment of Human Beriberi with Autolysed Yeast Extract (N. M. Saleeby, Manila, *Philippine Journal of Science*, January, 1919).—About twenty cases of human beriberi were treated with autolysed brewers' yeast extract. Adults were given from 150 to 40 c.c. three times a day. Children were given from 2 to 4 c.c. every three hours. Larger doses did not seem to give better results. No sign of poisoning was observed. Only acute and uncomplicated symptoms of beriberi were observed under treatment. Chronic nerve, muscular, or cardiac lesions were actually unaffected. All acute peripheral symptoms of neuritis were affected quickly. Marked results were noted in less than three days and a week's treatment seemed to give full relief in mild acute cases. Treatment was generally followed up for two weeks at least. Infantile beriberi symptoms were relieved with comparative rapidity. Edema yielded quickly, and nutrition improved at once. No special diet was prescribed. Patients were given regular hospital diets in accordance with the state of their digestion. Children receiving the extract continued to nurse at the mother's breast. The effect of the autolysed yeast extract used is similar to that produced by the hydrolysed extract of rice polishings; it seemed weaker, however.

Lymphocytosis in Soldiers (J. B. McDougall, *Quarterly Journal of Medicine*, July).—A continued clinical and hematologic examination of 438 soldiers, including controls, was made; altogether 515 total white cell counts and 607 differential counts were done. Lymphocytosis during the apyrexial periods and polymorphonuclear leucocytosis during the pyrexial periods was the condition found in the regularly relapsing type of trench fever. Cases of regularly relapsing trench fever and of the influenza type may merge gradually into the irregularly relapsing form. In the irregularly relapsing type there is no such definite fluctuation in the cells as is found in the regularly relapsing type. The existence of sustained lymphocytosis in the presence of a temperature swinging between 98° and 100° F., with symptoms of pain in the head, back and legs, especially in the shins, may be taken as typical of this form of trench fever. A normal differential blood count, in the absence of fever and subjective symptoms, may be regarded as proof of

the absence of trench fever infections. A certain proportion of cases of irregularly relapsing trench fever show an excess of large mononuclear cells. These cases are accompanied by very intense shin pains. The influenzal type of trench fever is the mildest form of the disease. The total white cell count in the enteric type is moderately high. In addition, polymorphonuclear leucocytosis is present during the fever. These points serve as useful guides in the differential diagnosis from enteric infections. The vast majority of cases of disordered action of the heart following trench fever show lymphocytosis, but this is present before the onset of the disordered action of the heart. Temporary accelerations of the pulse rate when the patient is at rest in bed, and especially when he is afebrile, are evidence of a predisposition on the part of the heart for involvement in a more permanent instability. Trench fever can be separated from malaria and influenza by repeated blood examination.

Malarial Pleurisy and Peritonitis (V. Cordier, *Annales de Médecine*, June, 1919).—There seems to be a direct action by the malaria parasite on the peritoneal and pleural serous membranes. Cases of malarial mammitis have been published recently, confirming the possibility of a direct action by the parasite on the tissues. Four cases typical of the pleural and peritoneal reactions are described. It may be acute in both pleura and peritoneum, with double effusion developing within a few hours, the intensity of the abdominal phenomena suggesting peritonitis from perforation. The pleurisy disappears without leaving sequelae. In another group there may be a peritoneal reaction without effusion but entailing meteorism, hiccup, vomiting and symptoms suggesting perisplenitis or gall-bladder complication. In another group the pleura seems to bear the brunt of the attack; two of the cases described presented this in a pure form. The effusion abounded in reds with almost pure mononucleosis, and eosinophilia not above 8 per cent. He never succeeded in demonstrating the malaria parasites in the effusions.

Abstract.

"DESERT," SEPTIC, OR VELDT SORE AMONGST EUROPEAN TROOPS.¹

By COLIN McK. CRAIG.

DURING the Egyptian and Palestine campaigns chronic sores, very resistant to local treatment, on uncovered parts, became a great scourge, especially amongst mounted units.

CLINICAL CHARACTERS.

The sore is invariably on exposed parts and mainly on those covered by hairs—i.e., dorsum of

¹ Abstracted from the *Lancet*, September 13, 1919.

hands, forearm, around elbow and knee-joints, on lower part of thigh, and exposed part of legs. In a small proportion of cases the lesions occur on the face.

(1) *The vesicle*.—The onset is sudden. The first appearance is one of acute inflammation round a hair follicle and in a few hours a vesicle forms full of clear straw-coloured fluid, varying from the size of a pea to half an inch or more in diameter. The pain is at first quite out of proportion to size of lesion. It soon bursts and exposes the deeper layers of the cuticle, thus forming a shallow ulcer.

(2) *The primary shallow ulcer*.—In the early stages the base is dry, red and glazed. It is acutely sensitive. In a considerable proportion a thin pearly-grey membrane may form, though its absence does not indicate a non-diphtherial origin. The edges of the surrounding skin become undermined and the ulcer commences to spread peripherally.

(3) *The chronic stage of the ulcer*.—The appearance is quite characteristic. It is punched out and circular in outline, with undermined edges and thickened margins. The base of such an ulcer is covered with grey-coloured débris, beneath which one can frequently determine a tough and adherent membrane. Such a deep ulcer may discharge little or no pus.

METHODS OF INVESTIGATION.

Scrapings were taken from the spreading edge of the ulcers by a sterile knife and inoculated directly on to freshly prepared Löffler's serum. In unbroken vesicles the skin was first washed with alcohol; the vesicle was then ruptured and the fluid mopped up from the base, then inoculated on to medium by a sterile swab. The base was also scraped.

THE RESULTS OF PRIMARY CULTURE.

One hundred and ninety-seven sores were investigated. The micro-organisms constantly present in the cultures were: (1) *staphylococci* (*S. albus*), rarely *S. aureus*, or *S. citreus*; (2) diphtheroid bacilli, of two morphological types, i.e.:—

(a) A small straight bacillus, staining uniformly with methylene-blue, Gram-positive but decolorizing with ease, showing no polar differentiation with Neisser's stain. Usually these small forms were present in moderate number and lay parallel in pairs.

(b) Forms morphologically identical with the true Klebs-Löffler bacillus.

Type (a) is an immature form of (b). Inoculation experiments showed that the small form was equally as toxic as the large and developed into the latter.

One or other of these types was present in 129 out of 197 sores examined—67.5 per cent. This percentage is high when the following facts are considered. (1) In the chronic stage of the sore

the bacillus is in scanty numbers and attenuated. (2) The frequent dressing of sores with antiseptic lotions. (3) With further cultures the positive findings would probably have been higher. (4) The positive findings compare favourably with results of swab culture of clinical diphtheria of the throat, especially under field conditions.

The following are the statistics of examination of swabs for Klebs-Löffler bacilli in this laboratory for two months in 1917: Total examinations, 5,442. Klebs-Löffler bacilli in throat, 455 (8.3 per cent.); diphtheria carriers, 34 (0.6 per cent.); contacts, 49 (0.9 per cent.).

ASSOCIATION OF SORES WITH FAUCIAL DIPHtheria.

During the period of investigation diphtheria both of throat and nose had been prevalent amongst the troops. The epidemic was distinguished by (a) the mildness of the average case; (b) the difficulty of tracing the source of infection. The question was to decide whether the diphtheroid bacillus in the ulcers was identical with the organism found in the throat.

The evidence I collected at that time may be stated as follows: there is a close correlation between the incidence of faucial diphtheria and the occurrence of the "desert" sore, the causal agent in each case being the true Klebs-Löffler bacillus.

The common occurrence of diphtheritic skin lesions under tropical conditions, as compared to their rarity in temperate climates, may be explained as follows: (a) by moistness of skin and activity of sweat glands, soddenness of epithelium providing an opportunity for entrance of bacilli and a suitable medium for their multiplication; (b) by the environment of the troops—close contact between man and man, lack of washing facilities, and constant liability to laceration of skin.

CONSTITUTIONAL DISTURBANCE AND TOXIC NEURITIS.

Major F. M. R. Walshe described a large number of cases of paralysis following "desert" sores, in one series in 27 per cent.

Medical officers all appear impressed by the amount of debility and weakness, especially of the limbs, which is associated with these ulcers, and quite out of proportion to the size, number, or extent of the lesions. The amount of military inefficiency was considerable, as these debilitated men were the first to fall out during the heavy desert marching. The muscular weakness was probably due to chronic absorption of the toxins in an amount insufficient to cause paralysis.

CONFIRMATORY BACTERIOLOGICAL TESTS.

Glucose-broth cultures of the small diphtheroid organism obtained from a "desert" sore, the organisms stained uniformly and showed no polar differentiation. 2 c.c. of the broth culture inoculated subcutaneously killed a guinea-pig

weighing 300 grm. in forty-eight hours, and from the necrotic tissue at site of injection typical polar staining Klebs-Löffler bacilli were obtained.

Six strains of diphtheroid bacilli isolated from throat lesions and five from "desert" sores all produced acidity in glucose broth after forty-eight hours' incubation. Both cultures of the strains in doses of 2 c.c. were injected subcutaneously into guinea-pigs of approximately the same weight. Eleven control animals were given a similar dose of the organism with the addition of 1 c.c. of diphtheria antitoxin. Of the five strains from "desert" sore, the injected animals died in twenty-four hours, twenty-four hours, thirty-six hours, twenty-four hours, and thirty hours respectively. All the controls lived. Of the six throat strains, five died in thirty-six hours, forty-eight hours, eighty hours, thirty-six hours, and sixty hours respectively; the sixth animal was ill, but recovered. All the control animals lived.

POST-MORTEM APPEARANCES OF INJECTED GUINEA-PIGS.

At the site of injection there was intense congestion and oedema of surrounding tissues; in those animals which survived for more than twenty-four hours also membrane formation. The viscera appeared normal. Klebs-Löffler bacilli were recovered on culture in every case from the site of injection—that is, from the necrotic tissue. Similar cultures from the heart's blood proved sterile, showing death from toxæmia.

Quails are susceptible to the diphtheria bacillus. Birds were selected after two months in captivity and in very good condition. 2 c.c. of a broth culture of a typical diphtheria bacillus isolated from a "desert" sore were injected into the pectoral muscles of one bird; a second was given a similar dose mixed with 1 c.c. of diphtheria antitoxin. The first bird died in sixteen hours. Considerable serous effusion found at site of inoculation, from which the bacillus was recovered; heart's blood was sterile. The second exhibited no symptoms.

The diphtheroid organism isolated from "desert" sores can be none other than the true Klebs-Löffler bacillus. Cutaneous lesions are not frequently associated with membrane formation and constitutional disturbances. Only a very small percentage of positive throat cases presented lesions or constitutional disturbances such as are commonly associated with clinical faucial diphtheria. Out of a series of 221 positive cases examined clinically only 10·8 per cent. presented such symptoms.

THE RESULTS OF ANTITOXIN TREATMENT.

Diphtheria antitoxin proved an absolute specific for the chronic "desert" sore of the type described. The sores which have resisted treatment for weeks and months heal in a few days with an average dose of 4,000 units. Critics have suggested that the normal horse serum would have the same effect. Anti-dysenteric serum (horse serum) had a

partial protective influence; the animals recovered, but suffered considerably nevertheless. The natural deduction is that horse serum normally contains a certain amount of antitoxin to the diphtheria bacillus.

GENERAL PROPHYLAXIS.

The bacillus is capable of a saprophytic existence. One medium is horse manure. From horse manure I isolated a diphtheroid bacillus morphologically identical with the Klebs-Löffler, but non-pathogenic to guinea-pigs. Since the troops have advanced into the cultivated portions of Palestine the incidence of "desert" sores has fallen to a negligible quantity. These facts, with the greater incidence of "desert" sores amongst mounted units, suggest an intimate connection between horse manure and the causation of throat diphtheria and "desert" sores.

PERSONAL PROPHYLAXIS.

The measures suggested are the protection of exposed parts of the body, and especially the knees, from injury; the wearing of "shorts" by mounted units is unsuitable. The use of antiseptic lotions to the arms and knees of the men, and especially to any abraded surfaces, is to be advocated wherever possible, as well as protection of sores with a dressing, and the avoidance of too intimate a contact between man and man.

CONCLUSIONS.

(1) That this "desert" or septic sore is a distinct clinical entity and has a distinct geographical distribution.

(2) That the aetiological factor is the Klebs-Löffler bacillus, which is responsible for the specific characters of the lesion.

(3) That this organism possesses a low virulence, and therefore only produces constitutional disturbances in specially susceptible individuals.

(4) That under favourable conditions these sores may be responsible for outbreaks of faucial diphtheria.

Against these conclusions certain objections raised are:—

(1) That the diphtheria bacillus is but a secondary infection superimposed upon some pyogenic lesion. The frequency with which I have isolated the Klebs-Löffler bacillus from the primary lesion with appropriate technique shows that it is a primary infection.

(2) The inability of pathologists at the base hospitals to find Klebs-Löffler bacilli in the majority of these sores. The more chronic the sore the greater the number of pyogenic organisms present, the more difficult it is to isolate the Klebs-Löffler bacillus. Also in base hospitals a large proportion of these cases were deep-seated pyogenic infections with which I was not dealing. This way explains the discrepancy between my results and those published by Warren Crowe.¹

¹ *Lancet*, 1918, ii, 667.

Original Communications.

THE CURE OF BILHARZIA DISEASE BY THE INTRAVENOUS INJECTION OF ANTIMONY.

THE PROPHYLACTIC ACTION FAR MORE IMPORTANT THAN THE DIRECT ACTION ON THE ADULT WORMS (SCHISTOSOMA H. AND M.).

By J. B. CHRISTOPHERSON, M.A., M.D., F.R.C.P., F.R.C.S.
Director of the Civil Hospital of Khartoum and Omdurman.

ANTIMONY pot. tartrate given to a patient suffering from bilharzia infection has two effects. It—
(1) Kills the mature (adult) worms in the portal vein and its tributaries.

(2) Sterilizes the contents of the ova which have been deposited in the rectum, bladder and tissues, and renders them harmless.

The first of these probably takes place early in the course of the injections—namely, after 3 to 5 gr. has been injected—this is striking enough—and I think that if we were only "out" to kill the adult worms we might stop the course of injections at this stage, i.e., after a total of a few grains have been used. But the injections must be continued if we wish also to accomplish (2), which is far more important than (1).

The injection of antimony appears to check, but not to stop altogether, the elimination of ova in urine and faeces, which may, and does, often go on at intervals for a year or two years after the complete course of injections has been given.

But the elimination of ova *ipso facto* in the urine is no criterion whatever of the cure or otherwise of the case, if by "cure" we mean complete cure, i.e., the adult worms killed and the patient rendered a non-carrier of the disease. Every ovum which passes by rectum or by the urethra should be sterile and incapable of being used by the intermediate host for the development of the extra corporeal cycle. Injections should be continued until this has been amply secured; in the non-appreciation of this may lie the reason of the various opinions regarding the dosage necessary for "cure."

I hold very strongly by the opinion that enough antimony has not been given until all the ova coming away in the urine or faeces are blackened, shrunken with shapeless interiors, and incapable of hatching out under any conditions, until there is good evidence, in fact, that all the ova which have been deposited by the worms before death are sterilized.

An opinion on this point can only be given after careful examination with the microscope, and this is at present the only logical and commonsense way of ascertaining whether sufficient antimony has been given. Such an examination is simple enough in all conscience.

In the article we (J. R. Newlove and J. B. C.) wrote in the JOURNAL OF TROPICAL MEDICINE AND

HYGIENE, July 14, 1919, we suggested that the optimum dose was between 20 to 30 gr., and that, whether you give your patient 20 or 30 gr. or some number of grains between 20 and 30, depends on what you see taking place inside the ova under the microscope.

Although both blood and ova may be absent from the urine after a course of injections, this is not an important point, for both blood and ova may be present after the patient is cured; the ova acting as foreign bodies take in some cases over a year to ulcerate through the mucous membrane into the lumen of the bladder or rectum, and they produce the microscopic blood, already noticed, in doing so. The practical point, with regard to the ova, when examining urine and faeces during the course of injections is: What is their condition? Are they normal-looking, alive and capable of development? and Do they hatch out under favourable conditions? or Are they all sterilized and black with structureless interiors and incapable of hatching?

Major Arthur Innes (*Brit. Med. Journ.*, September 13, 1919) considers the doses of ant. tartrate I recommended too large, and suggests 15 gr. He may be correct in his view. But I do not give the dose especially as 25 gr. This is about the average. I hold that the required dose is somewhere between 20 and 30 gr., and that the required dose is estimated by the appearance of the ova under the microscope. 20 to 30 gr. of antimony tartrate may appear an alarming quantity to some, but it must be made clear that one is working for a definite object. The microscope alone tells us when that object has been attained. Injections (intravenous) should be given no doubt with care and circumspection.

Dr. F. G. Cawston (*JOURNAL OF TROPICAL MEDICINE AND HYGIENE*, September 15, 1919) gives the account of a case of bilharzia disease successfully treated in South Africa by the intravenous injections of antimony pot. tartrate, and also publishes the chart of another case so treated.

One case had 9½ gr. by intravenous injections.

The other had 4½ gr. by intravenous injections, and 5 gr. per rectum (total 9½ gr.).

In both cases the administration of the antimony pot. tartrate appears to have been suspended when and because the urine was free from ova.

I hold that, although the number of ova appearing in the urine after the injections is undoubtedly diminished and they may even disappear for a time, the ova will continue to appear in the urine at intervals until those deposited by the worms before death are eliminated. This, in spite of the case being cured.

But the fact of ova being found in urine and faeces is of no account after the completion of the course of injections, provided they are sterilized ova, and this is what should be aimed at when giving the injections, otherwise the patient, in spite of the fact that he has got rid of his bilharzia adult worms, will remain a source of danger to the community. He will be a bilharzia carrier still. This

is what is meant by "Prophylactic" action of ant. (pot. tartrate) in the cure of bilharziasis. Antimony tartrate also acts on the ova and prevents the spread of infection.

Dr. F. G. Cawston's case has great clinical interest from the fact that it was a complicated case (he had renal calculus), and it was of twelve years standing.

It shows that the intravenous injections of ant. pot. tartrate are applicable to complicated and to old-standing cases.

It should be used with much caution in such cases, and this result may confidently be expected: That antimony will rid the patient of the primary bilharziasis, and he will be placed in a favourable position to rid himself of the complications by ordinary surgical or medical methods.

The cause of the malady will be cured. I may add that the complement-fixation test (N. Hamilton Fairley, *Lancet*, June 14, 1919, p. 1017) appears to me to offer a means of ascertaining whether the patient still suffers from active bilharzia disease or not. Eosinophilia will never do this, owing to other conditions besides bilharziasis giving rise to eosinophilia, and to the fact that the degree of eosinophilia in bilharziasis is variable.

Whether the complement-fixation test is applicable for the following investigation: Are the ova deposited in the bladder, rectum, and tissues all destroyed or not? is another question. If it is not so applicable, then the microscope is at present the only means of estimating the amount of ant. pot. tartrate sufficient for the "cure" of any particular case of bilharziasis.

THE INFECTION OF THEIR YOUNG BY TRYPANOSOME INFECTED MOTHERS.

(Preliminary Report.)

P. W. BASSETT-SMITH, C.B., C.M.G., F.R.C.P., F.R.C.S.

THERE is little direct evidence reported of the passage of Trypanosomes by the mother to the young, and none as to whether this takes place in the human race. In the light of recent research this is of considerable importance. The Sergent brothers and L'Heritier¹ have shown that in the camels, passage takes place from the mother to the foetus. Two of these infected with *Tr. berberum* aborted, and though no trypanosomes were found microscopically in the blood of the young, yet their blood injected intraperitoneally into a dog produced infection. Lanfranchi² has shown that the *Tr. brucei*, *rhodesiensi*, *evansi*, *gambiensi* and *lanfranchii* can be transmitted through the milk of nursing mothers.

In rats used by myself in continuous passage of *Tr. rhodesiensi* in many cases young have been born alive. The mothers lived from nine to fourteen days after infection. Examination of the placental blood of one rat, in which the uterus was found to contain a number of well developed embryos, trypanosomes were demonstrated. On examination of smears of the liver of these embryos, mature trypanosomes

were found in moderate numbers. It is therefore certain that *Tr. rhodesiensi* can pass direct from the mother's blood to the foetus. I have now living examples of direct infection of the young from a guinea-pig infected with a strain of *Tr. gambiensi*, derived from a naval rating who became infected in the Cameroons in 1915. The mother guinea pig was infected on July 23, 1919, two young were born on September 15, 1919, and appeared perfectly healthy; the mother showed at the time great numbers of trypanosomes in the blood, she suckled the young and they grew normally. On October 9, 1919, the mother was found to show trypanosomes in abundance, and in both of the young trypanosomes were present in small numbers. In this case it is impossible to say whether the young became infected in utero or by the milk; further investigation is being carried on. Curiously, I have never known in this laboratory a guinea-pig to abort or noticed the infection of the young before.

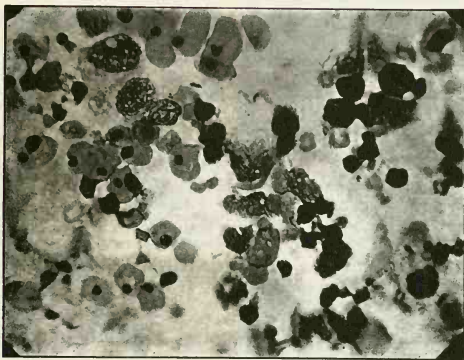
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¹ SERGENT et L'HERITIER. "Passage de trypanosomes de la mère au foetus dans le (Débat)." *Bull. Soc. Path. exot.*, t. 12, Avril, 1919, p. 177.

² A. LANFRANCHI. "Sur la possibilité du passage des trypanosomes dans le lait." *Arch. ital. de biologie*, t. 48, 1. 2, 1918, pp. 158-164.

Acute Paralysis after Vaccination against Typhoid (G. Guillain and Barré, *Annales de Méd.*, August).—A brigadier of 31, formerly a farmer, had three injections of the vaccine in 1915 and was in good health a year later, when 1.5 c.c. of the current vaccine from the laboratory of the military school at Val-de-Grâce was injected in the shoulder. That evening and the next day he complained of stiffness and numbness in the legs and hands, and by the third day he found he was unable to whistle. The symptoms progressed to paralysis, fatal the tenth day. There had been no preceding infectious disease, and the man had not been bitten by any animal. There was no history of syphilis or alcoholism, and he had three children.

Amoebic Liver Abscess (A. Chauffard and F. Françon, *Bulletin de la Société Méd. des Hôp.*, July 11).—A young man had an acute abscess in the liver, as large as a mandarin orange, following symptoms of amoebic dysentery. They administered emetine and neo-arsphenamin, and recovery was soon complete with merely these medical measures. The Bordet-Wassermann reaction was positive at first, but veered to negative under the first injection of emetine. They know of ten similar cases in which an acute amoebic abscess in the liver retrogressed completely under the emetin and neo-arsphenamin without the knife. In any event, the medicinal treatment should precede the operation.



SMEAR OF FETAL LIVER.

Unborn Rat, mother dead from infection of *T. rhodesiensis*. Shows presence of trypanosomes. \times about 750.

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THE JOURNAL OF

Tropical Medicine and Hygiene

NOVEMBER 1, 1919.

WHEN TO RETURN TO THE TROPICS AFTER BEING INVALIDED FROM MALARIA.

THE man who comes home on sick leave from the tropics owing to malaria, be it from the military or the civil services, from a plantation or from a

merchant's or banker's office, is usually allowed a few months, say four to six months, to get rid of the infection and to be in a fit state to take up work again. The leave is mostly six months, including a month on the way home and another month on the way out, so that four months at home is the "regulation" time. The doctor is called upon to report on the invalid's state about a month before the stated time to leave home, that is after the patient has been at home three months, and to state whether he will be fit to return at the stipulated time.

To make it plain: Suppose the patient gets six months' sick leave and that he starts for home on January 1: by February 1 he reaches Britain. He spends February, March and April in Britain or elsewhere, and on May 1 the doctor is asked to report as to the patient's fitness so that he may be back at work by July 1. Is it possible for a man suffering from chronic malaria, a malaria which defied quinine to cure when abroad, fit after three months' residence in a temperate climate to return to the tropics? Every medical man will answer the question in the negative. Yet he has to report, and if he answers the authorities under whom the invalid on leave is employed in the negative, he is then, naturally, asked to state when the invalid will be fit and ready to start for the tropics. Theoretically, it is a question impossible to answer; but theory plays no part either in military or civil matters of the kind, and an opinion of some kind has to be expressed and a decision come to. To a wise physician this is a troublesome problem, as illness will not conform to mathematical tables nor fall in with business views and rules. The doctor who relies upon microscopic tests as conclusive, and who failing to find malarial parasites in the blood pronounces his patient free of malaria and fit to go abroad again, will be bound sooner or later to come to grief as a diagnostician and be discredited in his future opinions. For nothing is more certain than that the absence, real or apparent, of malaria from the blood is no indication that the patient will have no more attacks of "ague." Most observers of experience know well that this remark is true, but the laboratory trained men in their enthusiasm declare that when no parasites are to be found the patient is free of infection; and that if no parasites are found and the patient still has attacks of fever at intervals, the fault lies with the observer and that were an expert to examine, parasites after a careful and prolonged search must be found. This is, of course, nonsense to any one with an intimate knowledge of microscopic investigation in malaria or almost any other disease. By itself the microscope is clinically faulty in the extreme, as was long ago proved by the Pathological Society of London investigations.

But supposing the person invalided from malaria has after three months no return of malaria fever attacks whilst in Britain, and that no parasites are to be found in the blood, is that person fit to return to the tropics with a certificate to say that he is

free from malaria infection? Certainly not, for experience disproves it; for such persons often have returns in the spring and autumn following, whether they remain in England or return to the tropics. The fact is that we have no real clinical test to prove or disprove the continuance of infection by malaria. Time alone can prove that the patient is rid of the infection. The non-recurrence of febrile attacks is the one and only positive evidence that the patient is finally rid of malaria.

As elucidation of several points brought forward in the above discourse the writer can illustrate by personal experience. It may be that one may be seriously affected by malaria, have malaria parasites in the blood, and a temperature considerably above the normal, and yet be unaware that he has now or ever had malaria. The following incident, already recorded elsewhere, will bear repetition. One day the writer was examining a patient's (woman's) blood who was suffering, as she frequently did, from attacks of fever, with the patient and another lady standing by. After showing to both the bystanders the presence of malaria parasites in the blood, he proceeded to show them what normal blood looked like below the microscope, and to do this drew some of his own blood from a finger and put the preparation below the microscope. To his astonishment he found a plentiful infection of his own blood with parasites, and on taking his temperature found that (at 11 a.m.) it stood at 102° F. He had no feeling of being ill, no headache, &c., and went about all day at his usual work without feeling inconvenienced in any way. If he had been asked if he ever had malaria he would have stated positively that he had never had malaria and that he was not infected. The incident explains the assertion of many a man that he never had malaria during several years' residence in a malarial district, whilst all his neighbours were constantly going down with it. In case it may be thought that the writer had made an error in his microscopic observation, it is perhaps necessary to state that the blood of the other lady present was examined and found perfectly free from infection; and for still further proof of the correctness of the examination the blood of this same lady a month later showed a deep infection and she suffered from her first attack of fever. Many persons who declare that they have never had malaria may even have a big spleen and the blood well stocked with parasites, discovered only because they come to the doctor with fever which developed after they reached British shores. These declare that the British climate does not agree with them, and insist on going back to the tropics as soon as possible.

The subsequent history of the writer's case is also instructive. The malaria infection was only too well founded, for in course of time fever caused incapacity, the spleen grew in size until when he reached England it was found to occupy half the area of the abdominal cavity. Work, however, was never given up, but for three years recurrences

occurred, especially in July, August and September the temperature was always above the normal, but seldom going above 102° F. Malaria parasites were never found in the blood during these three years, although examined by several experts, including Sir Patrick Manson himself. By the fourth year of residence in Britain attacks of fever were not experienced, but a low temperature obtained and a malaria neuritis of great intensity attacked the left upper limb which defied all treatment, medicinal and otherwise, for over three months. Luckily the writer had no intention of returning to the tropics. He had been ten years in the tropics without ever coming home—a huge mistake—and it took four years to get rid of infection. Then how about men not so fortunately placed; men who, as deeply infected as the writer was, with a big spleen and constantly recurring fever attacks, have to go back after say nine months, three months of that being extended leave, otherwise they run the risk of losing their appointments? A serious position for men in the forties, married it may be and with a family to support. What purpose does all this record serve? It is intended to show the difficult position the patient is in, the impossibility of the doctor being able to give assurance to the authorities, be they military or civil, that their employee, after several months or even a year at home, is fit to return to the tropics and take up work. How can a merchant or banker wait for say three years—the time the infection can be declared at an end—before their employee is definitely free of infection? To carry on business on these lines is evidently impossible, so what is the doctor to say or do in the matter? These questions came before the writer in another way: Two men, who had been soldiering in the tropics, came to him (the writer) when they were demobilized to be examined for appointments in the tropics. The writer passed them, as there was no evidence of malaria, no recent fever, no parasites found in the blood (the blood was examined at the London School of Tropical Medicine), no increase in size nor tenderness of the spleen. Yet a few weeks after these men reached their destination, one going to West Africa the other to the Malay States, they developed typical malarial fever attacks and they were adjudged to have acquired the fever whilst serving in the Army, and the writer was held to have committed a mistake in sending them abroad. How was he to arrive at the opinion that they were unfit to proceed to the tropics? The theoretical conclusion from the above cases is that they should not have been sent to the tropics again until three years had passed and they had lived during that time in a non-malarial country. Practically, were such steps taken, the world's work would come to a standstill.

It may be said that there is no proof that these two men mentioned may not have been reinfected, either on the way out or after they reached their destination. This is a possibility which refutes the supposition of previous infection as the cause, and

there is no available means of deciding it. Supposing a man who had been in the Army in Greece, Palestine or Mesopotamia comes home to Britain with a history of having had malaria in any one of these countries. On the way out to, say, Hong Kong the ship will have called at Ceylon, Penang, Singapore, and at any of those ports the traveller may have become infected with malaria and developed fever on the way out. Is it necessary to ascribe the appearance of fever to an old infection acquired in, say, Greece, Palestine or Mesopotamia? Can one tell that this attack is due to an old infection or to a fresh infection acquired on the way out? Again, if the traveller develops malaria at any period beyond ten days of landing the idea of its being an old infection is not dependable. When shall this question of the proper time to advise a man invalidated from malaria be settled? It would appear impossible to say short of a three years' residence in a non-malarial country that he is finally free. Perhaps some of our readers will contribute some advice on the subject, for it is a very pertinent question in the daily work of tropical doctors at home who have to decide in such matters.

J. CANTLIE.

Annotations.

Fatal Cases of Pernicious Malaria with Massing of Plasmodium Falciparum in Cerebral Capillaries (L. S. Dudgeon and C. Clarke, *Quarterly Journal of Medicine*, July.)—Twenty-one patients dying in coma showed massing of numerous malarial parasites in the cerebral capillaries. Every patient was energetically treated with quinine either by the intramuscular or intravenous routes, usually both, from the time of first coming under medical observation. The onset of such cerebral symptoms as drowsiness, mild delirium, apathy, restlessness, was noted as gradual in twelve. Of the remainder, nine, when first seen, were already deeply comatose, and no other history was available. In these it is at least probable that the onset of coma was sudden or that it deepened rapidly. Usually, the notes indicate a gradual progression from mild to deep coma. In twelve cases from the onset of the first important cerebral symptom, the end was fatal in twenty-four hours or less. The most rapid termination was six hours (one case) and the longest duration sixty hours (two cases). The temperature, where such record exists, was raised invariably from 100° to 105° F. The capillaries, and in the most severe cases the arterioles, were engorged with numerous infected red blood cells which showed the well-known tendency to collect at the periphery of the vessels, free parasites, melanin particles, prominent and detached endothelial cells. Various phases of development were represented, "dot" forms, fine rings, segmenting forms, but crescents were not seen. All gradations of blocking up to complete thrombosis with agglutination of and altered staining reactions of the corpuscles were exemplified. Small hæmorrhages around the smaller blood-vessels were seen in six cases. In

one instance the rupture of vessels had allowed the discharge of parasites into the tissues. In most instances examined the rupture of the cerebral capillaries or capillaries in other viscera had not led to the discharge of parasites into the tissues. Abundant infected red cells were seen filling the vessels or tightly packed toward the vessel walls, while absence of infected red cells in the hæmorrhagic zone was the rule, not the exception. Pigment, varying in amount, was present in the lining endothelial cells, in detached phagocytes and free in the lumen. Nerve cell degeneration was observed in eleven cases, as shown by cells of abnormal size and shape, loss of Nissl granules, eccentricity and distortion of nucleus to its complete disappearance. The spinal cord in one case showed advanced cell degeneration of the anterior corneal cells with the typical vascular changes and complete blocking of vessels. This patient had developed paraplegic symptoms before death. Local accumulations were found most often in the spleen, marrow, heart and pancreas; less frequently in the intestines, lung and suprarenals; occasionally in the liver, kidney and thyroid. Fatty and other degenerations of the cardiac muscle, acute tubal "nephritis," vascular changes in the suprarenals, terminating in tissue necrosis and all varieties of pulmonary congestion and hæmorrhage were recorded.

Myeloid Leukemia with nervous complications (J. Tapie and A. Cassar, *Archives des Maladies du Cœur*, May, 1919).—Complications of leukemia take the form of cerebral hæmorrhage, convulsions, facial paralysis, or symptoms from pressure on nerves by lymphomas, occipitofacial herpes zoster in the man of 57, and complete hemiplegia in the other, younger man, with rapidly fatal leukemia.

Autogenous Serum Therapy of Small-pox (K. Hata, *Japan Medical World*, August 17).—In non-hæmorrhagic small-pox no death occurred among those who had been treated with autogenous serum. In hæmorrhagic cases, it produced 16 per cent. less mortality than the symptomatic treatment. In all the cases of small-pox combined the mortality was 8.6 per cent. less than with the ordinary treatment. The entire course of the illness was made strikingly short. Reconvalescent serum seems to have some therapeutic efficacy. Normal serum (human) seems to have no therapeutic efficacy against small-pox.

Malaria in Cuba (J. Le-Roy y Cassá, *Revista de Medicina y Cirugía*, August 25).—Practically everyone in Cuba had malaria at the close of the war. There were 4,107 deaths from malaria in 1900. The Americans' efforts to eradicate yellow fever reduced the numbers of malaria mosquitoes as well as of the stegomyia. In 1913 there were only 447 deaths ascribed to malaria. In ten years the malaria death-rate had been reduced from 2.52 to 0.33 per thousand inhabitants of the island, and in Havana from 1.30 to 0.02.

Abstract.

BILHARZIASIS: ITS INCIDENCE AND ERADICATION.¹

By (Mrs.) B. SHELDON ELGOOD,

AND

THOMAS CHERRY.

THE history of *D. hepaticum*, the ordinary liver fluke in sheep, shows that these trematodes easily adapt themselves so as to use different species of mollusca as intermediate hosts in different parts of the world. In addition to the presence of a suitable snail, it appears that the other essential condition is a scanty water-supply at a warm period of the year. Thus two islands in the Eastern Mediterranean—Crete and Cyprus—present divergent conditions, although both have winter rains and dry summers, and both have long been in close communication with Egypt. Crete is free from the disease because the lofty mountains keep the streams flowing all through the summer, whereas Cyprus is infected because it contains marshes with water drying up in early summer, and a river with holes in its bed which even at the end of summer contained enough water to bathe in. In Algeria cases appear amongst the French troops with increasing frequency as their camps approach the Sahara. Arabia, with little water, is infected; Syria, with abundant springs, is free. Scanty water-supply is found even in some heavy rainfall or flood regions during the dry months of the year. Such conditions are found in Venezuela, some of the West India islands, and Mesopotamia, all of which are infected. The spread of bilharzia is thus favoured by concentration of the molluscs, making it easier for the embryo to find them; by concentration of the cercariae per cubic foot of water; and by concentration of human activities around water.

LOCATION OF THE DANGER ZONE IN EGYPT.

If the foregoing considerations are correct it is very unlikely that such immense volumes of water as the Nile can ever become charged with cercariae to a dangerous degree. The cercaria does not multiply after it has been discharged into the water from the snail. Moreover, men who have contracted the disease nearly all ascribe their infection to bathing in a small canal or in a small pool filled from the canal, and while nearly a thousand men bathed freely in the river during 1916 no resulting cases of disease have been reported. In addition, the snails are not easily found on the banks of the Nile or of even medium-sized canals, but are common in the small channels which ramify through every irrigated field. Since the fellaheen of all ages are very often in contact with the water in these

small channels, it is easy to understand how the vast majority of such folk become subject to the disease. But while it is established that the population of Cairo is very heavily infected the mode of infection has not yet been made clear.

In order to ascertain the age at which infection becomes common, 186 children were examined consecutively at a native dispensary in one of the poorest quarters of the city. Microscopic examination of the urine gave the following results: Out of sixty-two infants under 4, two were found to be infected; sixty-two children from 4 to 7 yielded two infected cases; whereas among the same number of children from 7 to 15, twelve proved to be infected.

No attempt was made to determine the extent of intestinal infection. The examination of thirty of the mothers of these children revealed no sign of urinary infection. The prevalence of the disease amongst the better classes may be inferred from the fact that at the present time 25 per cent. of youths, aged 16, applying for entry into the professional branch of one of the public ministries are rejected on this account. Former estimates placed the incidence at from 50 to 80 per cent. of boys between the ages of 10 and 18, and 25 to 30 per cent. of girls of similar ages. The number of women affected at the age of 40 is less than 3 per cent. These figures point to some method of infection which hardly operates during infancy, becomes active during childhood, and ceases to affect the adult women to any great extent so long as they reside in the city.

The hypothesis that Nile water, as supplied to the gardens in Cairo, is the chief source of infection does not meet the age periods during which infection is active or quiescent. Having decided that unfiltered Nile water is probably not a serious danger, we examined the mollusca present in the small collections of water in places where the children can reach them. Specimens of *Bullinus* and *Planorbis* were found in small numbers in public ponds and fountains in Cairo. They were also present in a small fountain in a private garden and in the casks sunk in the ground from which the watering cans are filled. The Arab gardeners were quite familiar with the snails, and volunteered the explanation that they came from the Nile, which may or may not be correct. The large marble bath in the garden of the old Ismailia Palace is now dry, but there are on the floor abundant recent shells of *Bullinus*, *Planorbis*, *Limnea* and *Unio*. Many snails are also present in small irrigation channels in the suburbs irrespective of the source of the water.

Suitable intermediate hosts are therefore present in the city and suburbs, and the habits of the people make it certain that these collections of water will often receive the ova of the trematode. Some of the Australians merely washed their hands and arms in these ponds, and yet received a full dose of the cercariae. The Arabs rinse their mouths and drink the fountain water, while the children of native servants are often allowed to play in the employer's garden. It is, perhaps, more than a coincidence that the only European girl known by us to have

¹ Abstracted from the *Lancet*, October 11, 1919.

become infected in Egypt used to be taken regularly by her nurse to the lawn surrounding one of these fountains. The importance of these sources of infection, however, is growing less every year, as, owing to the campaign against the mosquito, the fountains are disappearing from private gardens and the canals and ponds are being filled up. The suburban irrigation channels appear to be the only serious local menace.

THE SHAM-EL-NESSIM.

As these local sources could not account for all the infections we looked further afield. The Coptic Easter Monday is kept by all Egyptians, Moslem as well as Christian, as the Sham-el-Nessim. On this festival parents make every sacrifice in order that the children may have a good time. The family leaves home early in the morning for the country, and the children are allowed to play as they please around the banks of the ubiquitous channels. At this time of the year infection is likely enough to follow an hour's paddling in the water. Besides including children of both sexes and of every social rank, this annual exposure to infection accounts for the age incidence which we find in Cairo. At the age of 6 or 7 the children become more independent and remain in the water for a longer time than the infants. This regular exposure to the attacks of the cercariæ is the most important factor in the causation of the disease among the city population. The second but much less important factor is found in the suburban irrigation channels and other small bodies of water already noticed.

ERADICATION OF THE DISEASE.

Up to the present time no attempt has been made to control the spread of this disease amongst the Egyptians—its presence for more than 3,000 years investing it with the apparent authority of Fate. Interest in the matter may also die out because the regulation of bathing removes all danger of infection as regards the British troops in the country. Yet it would probably be an easy matter to eradicate the disease from the Delta and the Egyptian portion of the Nile Valley. In this connection two important points may be emphasized: (1) that the danger spots are the small channels running through the fields, not the river or the large canals; (2) that a flock of ducks will quickly remove the snails from any small body of water and prevent these mollusca from re-establishing themselves.

We have already set out the evidence for the first of these propositions. The second is based on the following observations. All the ponds but one in the Zoological Gardens, Cairo, are frequented by ducks, both tame and wild. In these ponds snails can be found only after a prolonged search, and then only small specimens. The exception is a lily pond, which is kept free from ducks and is well stocked with half a dozen common species of mollusca. The lake in the Botanical Gardens, Melbourne, which has long been a sanctuary for wild

ducks, is quite free from snails, and a similar alternation of snails and ducks holds good in Adelaide and Perth. The proclivity of ducks for snails is as marked on dry land as in the water. They not only keep gardens free from these pests, but they search the bushes and herbage for land forms, such as *Helix pisana*.

Thus in order to eradicate bilharziasis in Egypt each village should keep its own channels free from snails by means of a flock of ducks. The local duck, which is not a common domestic bird, may be suitable for this purpose; but in Egypt the Pekin, Muscovy, and Indian Runner ducks would doubtless thrive as well as in hot, dry parts of Australia. The green and dry berseem or clover would form part of the food of the birds, and the children could keep the flock in the required portions of the channels. The keeping of ducks would not be an innovation, but an extension of native custom in widely separated districts. The birds might be made a source of substantial profit to each village, and a bonus might be offered for the production of birds of specified quality for table use.

In the first place, a canal supplying a dozen villages might be selected for experiment and the results observed. A small expenditure is thus all that is necessary to give the scheme a trial, while the eradication of the snails would confer an inestimable benefit upon the whole native population.

LONDON SCHOOL OF TROPICAL MEDICINE.

SCHOOL DINNER.

THE Tropical School dinner was held at Princes' Restaurant, Piccadilly, London, on Thursday, October 16, 1919, Dr. Andrew Balfour, C.B., C.M.G., M.D., in the chair. The dinner was well attended. Amongst those present we noted Sir Charles Addis, Col. A. Alcock, C.I.E., F.R.S., I.M.S., Dr. C. H. Allan, Algernon Aspinall, Esq., C.M.G., A. Bagshawe, Esq., C.M.G., M.B., B.C., Andrew Balfour, Esq., C.B., C.M.G., M.D., M. E. Barnes, Esq., M.D., Surg.-Capt. P. W. Bassett-Smith, C.B., C.M.G., R.N., Capt. R. E. V. Bax, Bennett, Esq., Sir William Bennett, K.C.V.O., F.R.C.S., P. Blessig, Esq., J. L. Bonhote, Esq. (Cairo Zoological Gardens), C. J. Brightman, Esq., O.B.E., Representative of *British Medical Journal*, Capt. Niel Cantlie, M.C., R.A.M.C., Sir James Cantlie, K.B.E., F.R.C.S., A. Castellani, Esq., M.D., M.R.C.P., Sir Havelock Charles, G.C.V.O., G. R. Cheeseman, Esq., N. Cheua, Esq., M.R.C.S., L.R.C.P., C. C. Chesterman, Esq., O.B.E., M.B., B.S., J. B. Christopherson, Esq., F.R.C.P., F.R.C.S., Capt. A. W. Clarke, C.B.E., G. Croll, Esq., Guest of G. Croll, Dr. V. St. John Croley, Col. S. Lyle Cummins, C.B., C.M.G., James Currie, Esq., C.M.G., Arthur Davies, Esq., M.D., M.R.C.P., S. H. Daukes, Esq., M.B., Ch.B., W. Dawson, Esq., M.B., Ch.B., Capt. J. R. Dew, Professor C. Dohell, F.R.S., Col. R. H. Elliot, I.M.S., Col. N. H.

Fairley, O.B.E., A.A.M.C., Sir Walter Fletcher, K.B.E., F.R.S., Sir Peter J. Freyer, K.C.B., I.M.S., L. A. Garrett, Esq., R. P. Garrow, Esq., M.D., J. C. Gilbert, Esq., Gen. Sir Thos. Goodwin, K.C.B., C.M.G., D.S.O., Stanley Hamp, Esq., F.R.I.B.A., H. M. Hanschell, Esq., D.S.O., N. H. Harrison, Esq., M.R.C.S., L.R.C.P., Professor R. Tanner Hewlett, M.D., F.R.C.P., Professor J. T. Hill, F.R.S., Henry Hopkins, Esq., C.I.E., W. F. Hume, Esq., M.D., Arthur Jones, Esq., Representative of *Lancet*, Professor R. T. Leiper, M.D., G. C. Low, Esq., M.D., M.R.C.P., J. M. H. MacLeod, Esq., M.D., F.R.C.P., Sir Charles C. McLeod, Dr. Maitland, Sir Patrick Manson, G.C.M.G., F.R.S., P. Manson-Bahr, Esq., D.S.O., M.D., M.R.C.P., Basil E. Mayhew, Esq., P. J. Michelli, Esq., C.M.G., H. T. Moore, Esq., Lieut. C. H. Moore, Representative of *Morning Post*, J. Cyril Nairne, Esq., Dr. A. R. Neckles, H. B. Newham, Esq., C.M.G., M.D., M.R.C.P., Dr. F. W. O'Connor, J. A. Ormerod, Esq., M.D., F.R.C.P., A. R. Paterson, Esq., M.B., Ch.B., A. Payne, Esq., Major Marian Perry, O.B.E., R.A.M.C., Col. J. J. Pratt, I.M.S., H. Ridley Prentice, Esq., M.B., M.R.C.P., Col. W. Thos. Prout, C.M.G., Sir Herbert Read, K.C.M.G., C.B., Sir Ronald Ross, K.C.B., K.C.M.G., Col. Wm. Salisbury Sharpe, R.A.M.C., Professor W. J. Simpson, C.M.G., M.D., F.R.C.P., Col. G. E. F. Stammers, O.B.E., Dr. A. C. Stevenson, G. R. Stilwell, Esq., O.B.E., M.B., J. G. Thomson, Esq., M.B., Ch.B., T. H. Vaughan, Esq., H. S. Wellcome, Esq., Dawson Williams, Esq., M.D., F.R.C.P., R. M. Wilson, Esq., M.B., Ch.B.

After the loyal toast Dr. Balfour, the Chairman, proposed the toast of the London School of Tropical Medicine in an eloquent speech. After paying a tribute to the founder of the School, the late Mr. Joseph Chamberlain and Sir Patrick Manson, and to the teaching staff of the School, he traced the development of the School and dwelt upon the many expeditions and discoveries to the credit of the men who had been sent forth to the tropics from the School. Amongst these he referred in congratulatory terms to Professor Leiper, Dr. Manson-Bahr, Dr. Castellani, Dr. Sambon, Dr. George Low, Dr. O'Connor, Dr. Wenyon, Lieut.-Col. Newham, and several others who had made world-wide reputations.

The Chairman complimented the School upon the transference of the School to London from the Albert Docks. However expedient the latter situation was in the early days of the School, it is a wise move to transfer it to a more central position where a real tropical clinic would be established and many practitioners in London and elsewhere would have the opportunity of seeing patients suffering from tropical disease and where they would have the opportunity of listening to experts in tropical diseases discoursing at the bedside.

He coupled the toast with the name of the Dean, Sir Haveock Charles, K.C.V.O., who responded in an eloquent speech and paid a high compliment to

the Secretary of the School, P. Michelli, C.M.G., and to Sir Percival Nairn, the Chairman of the Committee of the Seamen's Hospital, who by his wise judgment and advice had rendered the School signal service. He thanked also the Director-General of the Army Medical Service, Sir Thomas Goodwin, K.C.B., who was present, for what he had done in promoting the interests of the School.

The toast of the guests was given in felicitous terms by Captain A. W. Clarke, C.B.G., who paid a high compliment to the voluntary services of the medical profession in giving their services gratuitously to the London Hospitals and to other hospitals throughout the kingdom, a public benefaction which was apt to be lost sight of by the public. He welcomed several of the city merchants amongst them, many of whom had by liberal gifts placed the finances of the School on a sound basis. He coupled the toast with the name of Sir Charles C. MacLeod, one of the most liberal benefactors, who suitably replied and modestly referred to the little that they had been able to accomplish in the way of assistance.

Sir Patrick Manson, G.C.M.G., said that much too much had been said about what he had done for the School and for tropical medicine and spoke in eulogistic terms of what Dr. Balfour himself had done to advance the science and the study of tropical medicine.

The Chairman's health was proposed by Sir James Cantlie, who referred to the part Dr. Balfour had taken in his collegiate days in literature by giving us such excellent novels as "By Stroke of Sword," "To Arms," "Vengeance is Mine," "Cashiered and other War Tales," "The Golden Kingdom," &c. By his giving up literature the world had lost another Stevenson, but science had gained a master mind. In many parts of the world Dr. Balfour had studied disease in its varied aspects and under the ægis of that great and generous devotee and supporter of investigation, H. S. Wellcome, Esq., had organized a laboratory of research at Khartoum, unique of its kind and productive of work of the highest scientific value. No less famous and valuable is the Wellcome Bureau of Tropical Medicine in London, of which Dr. Balfour is the Director-in-Chief, and Dr. Wenyon, formerly one of the most illustrious members of the staff of the London School of Tropical Medicine, is his able coadjutor.

Dr. Balfour, before leaving the chair, brought forward the claims of the laboratory assistants engaged in tropical schools to warm recognition for their work, which was done silently, devotedly, and often with a scientific precision which showed an intellectual ability of no mean order.

Dr. Newham, Superintendent of the London School of Tropical Medicine, on behalf of the laboratory assistants, returned thanks and feelingly expressed his estimation of the devotedness, the scientific acumen and great services, all too frequently on wholly inadequate pay, of this most capable group of men.

Original Communication.

A SIMPLE METHOD OF MOUNTING AND PRESERVING INSECTS, ETC.

By ALFRED MOORE, M.D., D.T.M., & H. Cantab.

Assistant M.O.H. Shanghai.

If more medical men, resident in remote tropical stations, could be induced to take up the study of entomology, the result could scarcely fail to be of immense advantage to themselves, and of inestimable benefit to science and their fellow-men, for this pursuit is not merely a most delightful hobby well calculated to banish ennui from the monotonous restricted life of the isolated exile, but is also a comparatively new and unexplored field for research work, of vast practical importance to suffering humanity. The class of men here referred to usually have plenty of leisure time at their disposal, and by their biological training and familiarity with the microscope are thoroughly well equipped for investigating the structure, life-history, and habits of the teeming insect world around them, many forms of which are extremely active agents in propagating disease, or in ravaging and destroying agricultural products in the surrounding country.¹

Numerous competent observers have been deterred from engaging in this fascinating pursuit by the fact that it is absolutely necessary to make a good collection of insects for immediate examination as well as future reference, and the present methods of mounting and preserving these delicate creatures are very troublesome, mutilate the specimens badly and yield by no means satisfactory results. The extreme fragility of insects pinned out in the usual way makes it undesirable to handle them freely, and this interferes with their educational value; such specimens are indeed very awkward to examine satisfactorily even with a simple lens, and are altogether unsuitable for adjustment on a microscope stage. Further, if pin-mounted specimens are left exposed to the air they rapidly shrivel up in dry weather, and become mouldy during the wet season; they must therefore be kept constantly shut up in tightly fitting cases containing preservatives, and these cases are apt to become warped, besides being cumbersome articles to transport when changing station. Moreover, even the most carefully constructed boxes fail to assure protection, as is evident from the following humorous account of a butterfly-collector's troubles: "When the specimen is ready for the case, it will thenceforth be conspired against, night and day, by various enemies, the worst by far being

an atrocious round beetle, whose offspring is a still more atrocious hairy grub, which will occupy the inside of the butterfly and eat away its body, until the wings, with nothing left to connect them, fall to the ground, and the bare pin stands, a melancholy monument to tell where the gorgeous specimen once spread its splendours. This grub seems to fatten on the smell of camphor or turpentine, and the only device of any permanent avail against it, is to dissolve a little corrosive sublimate in spirits of wine, and with a fine feather anoint the whole body of each butterfly thoroughly. If you make the mixture too strong, it will assuredly leave an unsightly white film upon the back of every black specimen, and if you do not make it strong enough it will only act as a tonic to the grub. These are the Seylla and Charybdis between which you must steer." Under these circumstances it is little wonder that but few residents in enervating tropical climates have sufficient energy and perseverance to become successful bug-hunters.

All these drawbacks, however, can be avoided by merely enclosing each insect in a separate, flat, transparent chamber, hermetically sealed, so that destructive agents of all kinds are excluded from gaining entrance, and the specimen itself is prevented, as far as possible, from giving off its natural moisture and thus becoming completely shrivelled up. This is easily effected with the aid of the following simple requisites: (1) Glass slides cut from ordinary clear window glass, convenient sizes being 2 in. by 1 in., for insects of average dimensions, and 3 in. by 1½ in. for larger specimens or pairs, whilst discarded photographic plates are useful for exceptionally large forms or groups. (2) A substance, which may be called 'Thymoplas,' prepared by incorporating 1½ drams of finely powdered thymol with 1 lb. of the modelling putty known as "plasticene."³ And (3) sheets of thin tough white paper gummed on one side and cut into ½ in. wide strips.

These materials are employed as follows: the insect to be mounted is laid in a suitable position on the centre of a glass slide; next a piece of thymoplas, about the size of a bean but varying with the size of the insect, is placed on any flat surface and covered with a glass plate, which is then rolled backwards and forwards a few times, under pressure, until the thymoplas takes the shape of an elongated roll, about once and a half the thickness of the specimen to be mounted. In the case of thick insects neater preparations will be obtained by making the roll only about as thick as the insect, the additional depth required being

¹ It has been estimated that insects cause an annual loss of more than \$700,000,000 to the agricultural interests of the United States of America. What, then, must be the injury inflicted by the superabundant insect population infesting agricultural districts in the tropics?

² "Tribes on my Frontier. An Indian Naturalist's Foreign Policy," by E. H. Aitken. Page 102.

³ In a recent publication (*Journal of the Royal Asiatic Society, North China Branch*, vol. 1, p. 162, &c.) the present writer recommended a mixture of naphthalene and plasticene which gave good results in the cold months, but proved to be too soft and messy for use in the hot weather. Thymol was therefore substituted for the naphthalene, and was found to be a great improvement. Being a very potent preservative (carholic acid coefficient = 19), a small quantity of thymol suffices. This makes it easy to knead into the plasticene, the firm consistence of which is not altered thereby, even when the temperature rises above 90° F. in the shade.

obtained by squeezing this roll into a broad, flat ribbon. The two ends of this roll or ribbon are taken between the finger and thumb, and the loop so formed is cast round the insect as it lies in position on the slide, making a complete circle, wide enough to allow for the full spread of the insect's limbs, etc.; the superfluous stalk of the loop is then detached, and at this point, where the ends meet on the slide, a secure joint is made by a few touches with a blunt stick or pen handle, care being taken to make it the same depth as the rest of the ring. A second glass slide having been placed on the top of the thymoplas ring,—with its four sides coinciding accurately with those of the underneath slide,—is now pressed down firmly until it first flattens out the thymoplas evenly all round, and then, with further gentle pressure, comes to bear *very lightly* on the enclosed insect, thus keeping it in position. The opposite ends of the two superposed slides are next securely bound together, by passing a strip of gummed paper round each in turn, taking care, while doing so, that sufficient pressure is maintained to keep the slides in close contact with the flattened thymoplas ring, without pressing unduly on the enclosed insect. Finally, full details concerning the specimen should be written on the ample surface provided by the paper binding.

In the case of very small insects ordinary microscope slides, 3 in. by 1 in. should be used and a large round cover glass be placed on the thymoplas ring; pressure is applied as before by a second glass slide, which is then removed, leaving the cover slip in position: any excess thymoplas, which may have been pressed out beyond the edge of the cover slip, should be trimmed off and the specimen completed by affixing a paper label with the details on the end of the slide. With a very little practice the whole process can be neatly carried out in a few minutes; it is, in fact, so simple, and the result is so nearly foolproof, that the method seems ideal for class work. The completed preparation permits the most fragile insect to be handled with impunity, enables every part of it to be readily examined with the naked eye, lens, or microscope, and is particularly adapted to photographic purposes; if left lying about on the working bench, it will not suffer thereby either from moulds or destructive insects, nor can its labels be misplaced or lost. Moreover these specimens are very compact and portable, for they can be arranged on superposed trays and stored in convenient sized cabinets, made like the ordinary microscope specimen box, but somewhat deeper and stronger on account of the greater thickness and weight of these preparations.

A very moderate amount of ingenuity will enable all sorts of instructive preparations to be mounted in this way. Thus, when mating couples are captured, they can be mounted on the same slide, so as to demonstrate the frequently extraordinary difference in appearance of the two sexes; for instance, the contrast between the winged male firefly and the wingless glowworm. Leaves, twigs,

bits of tree bark, or small stones on which insects have laid their eggs, can be mounted intact, and in some cases the mother may be shown with her offspring: e.g. a queen ant in her cell surrounded by her eggs, or a spider carrying her purse of eggs. Caterpillars should, if possible, be displayed in their natural habitat (inside galls or rolled up leaves, etc.), and cocoons be opened so as to exhibit their contents, whilst all the stages in development—egg, larva, pupa, and mature insect—can be advantageously arranged in one specimen; thus the writer successfully mounted a twig of acacia from which is suspended a small wasp's nest, showing open cells, with eggs and various sized larvae in them, closed pupa cells, and half a dozen full grown wasps engaged in various domestic operations, exactly as the specimen appeared in nature. The mimicry of insects may be illustrated by including the imitated object, characteristic poses should be reproduced, and predaceous creatures exhibited clutching their victims, etc., etc. In this way the mounting of insects ceases to be a stupid mechanical process of empalement, and becomes a pleasing and instructive art. Nor need the method be restricted to spiders and insects, for it can obviously be applied to many other small creatures and indeed to innumerable interesting objects presented by the hazard of the chase.

COLONIAL MEDICAL SERVICES.

COMMITTEE OF INQUIRY APPOINTED.

LORD MILNER, G.C.B., Secretary of State for the Colonies, has appointed a committee to consider the position of the medical services of the various colonies and dependencies, with a view to maintaining and increasing the supply of candidates and to securing contentment within the service; and to consider whether the principle of assimilating the medical service of neighbouring colonies may usefully be extended, and, if so, how far, and by what means.

The members of the committee are:—

Chairman.—Sir Walter Egerton, K.C.M.G., late Governor of British Guiana and recently chairman of the Pool (Petroleum Supplies) Board.

Lieutenant-Admiral Sir Harry Verney, Bt., D.S.O.

Surgeon Rear-Admiral Sir Humphry D. Rolleston, K.C.B., M.D., F.R.C.P.

Major-General Sir W. B. Leishman, K.C.M.G., C.B., M.B., F.R.C.P., F.R.S., K.H.P., A.M.S.

Lieutenant-Colonel Sir James Kingston Fowler, K.C.V.O., C.M.G., M.D., D.Sc., F.R.C.P., R.A.M.C., (T.).

Mr. T. Hood, C.M.G., M.R.C.S., L.R.C.P., Director of the Medical and Sanitary Service, Nigeria.

Mr. A. Fiddian, Principal Clerk, Colonial Office.

Mr. J. E. W. Flood, of the Colonial Office, is secretary.

A.



Order.—Hemiptera.
Family.—
Genus.—

Site.—On shrubs in damp waste ground.
Loc.—B. W. Rd., Shanghai,
15/8/19.

Order.—Diptera.
Family.—Tabanidae.
Genus.—*Tabanus*.



B.

Site.—On tree stems near horses' training ground.
Loc.—C. M. F., Shanghai,
1/8/19.

Order.—Diptera.
Family.—Culicidae.
Genus.—*Desvoidia*.



C.

Site.—Undergrowth in damp waste land.
Loc.—C. M. F., Shanghai,
1/8/19.

Order.—Diptera.
Family.—Culicidae.
Genus.—*Aedes*.



D.

Site.—Marshy undergrowth.
Loc.—C. M. F., Shanghai,
1/8/19.

- A.—Three plant bugs mounted on 3-in. by 1½-in. slides.
B.—Gadfly mounted on 2-in. by 1½-in. slides.
C.—Mosquito (*Desvoidia obturbans*) mounted on 2-in. by 1½-in. slides.
D.—Mosquito (*Stegomyia scutellaris*) mounted on ordinary microscopic slide.

Notices.

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THE JOURNAL OF

Tropical Medicine and Hygiene

NOVEMBER 15, 1919.

HOW SOON MAY A PATIENT INVALIDED FROM DYSENTERY BE CONSIDERED FIT TO RETURN TO THE TROPICS.

DYSENTERY has come to be regarded as a tropical disease, although there is no real justification for limiting the geographical distribution to the Tropics. The name was evolved centuries before the scientific

and mechanical means of diagnosis were available or micro-organisms were discernible. The derivation of the word usually set forth is *δυσ*, signifying "difficulty" or "ill" and *τερρας*, which varies in its interpretation; sometimes it is chosen to designate the alimentary canal, the whole bowel, or small intestine only. Thus "difficult" or "ill," "alimentary canal," "bowel" or "small intestine" have therefore a wide significance which, however, at the present day, in spite of precise means of diagnosis and the more scientific nomenclature in vogue, still holds, for the most varied degrees of bowel derangements are grouped under the more or less legendary title of dysentery. The modern limitation of the word confines dysentery to being a specific febrile disease, caused by micro-organisms of several types, presenting uncertain inflammation of the large intestine and lower ileum attended by ulceration, local pain, evacuation of blood and mucus, tenesmus, and inducing physical and nervous prostration. The etiology comprehends dysentery of an amœbic, bacillary, scorbutic, malarial, or an epidemic origin; nor do these by any means exhaust the list of aetiological factors.

Popularly the presence of blood and mucus in the stools determines the name and there the matter for the present rests. How often do we hear soldiers and civilians who reach Britain from a tropical country say "Yes, I had dysentery, but I never laid up for it." The doctor in entering this statement places a query after the word dysentery in this instance, for it was evidently not really dysentery this patient had.

We are not now, however, discussing initial attacks of dysentery, but only the aftermath of the disease as it presents itself to medical practitioners in Britain. The patient consults the doctor because he has irregular stools, that he suffers from diarrhoea, sometimes from constipation and in both conditions mucus is persistently present. Almost invariably there is an account of intermittent attacks of illness lasting for a few days, in which there is pain, tenesmus, marked intestinal flux, with an evacuation consisting almost wholly of blood and mucus. Fever may or may not be present. These attacks may come on at intervals varying from a week or two to a month or two or even longer. Between attacks the patient is apparently well and even mucus disappears or all but disappears from the stools. The point under discussion really is how long an interval is to be given after an attack to declare the patient recovered and fit to return to the Tropics. To what extent does microscopic examination of the stools help us? To prophesy upon microscopic findings will lead to disappointment. To be told that no ova, cysts, pus cells, few blood cells, epithelium, &c., is in evidence is not sufficient for the doctor to declare that no recurrence will take place, and that therefore return to the Tropics may safely be recommended. These intestinal troubles will almost certainly return to some degree. Sprue,

for instance, may recur for a week or two every three or four years. The writer has recorded a case of the kind in which recurrence, at long intervals, took place during twenty-three years, following a case of sprue which lasted for seventeen years—1878 to 1895—and in which from 1896 to 1919 a sharp attack of sore tongue and copious frothy stools occurred every second or third year with intervals of quite healthy and normal stools; the patient meantime residing continuously within the Tropics. In cases of acute dysentery with post-dysentery diarrhoea and apparent cure, sharp attacks of dysentery (blood and mucus) occasionally recur after an interval of two or even five years although the patients are resident in Britain. These recurrences may be short—a week or two, followed by a normal condition for years. One may theorize upon these recurrences, and say the anæbæ, the cysts, the bacilli, &c., have never been wholly eradicated—but that does not help one to definitely say whether relapses may or may not occur, as during the intervals neither clinical nor microscopic findings indicate the presence of continued infection.

The sigmoidoscope is the chief aid we have to determine the presence or absence of post-dysenteric conditions. Without it we are working in the dark and all is mere guesswork as regards treatment, &c.

The sigmoid is now unfortunately apportioned into the pelvic and rectal portions by the anatomist, a step which neither physiologically nor clinically is justifiable. The sigmoid from its position, its functions, its clinical and its pathological features is an organ in itself, not a mere passage-way. Its upper and lower ends are definite points marked by an inlet and outlet as distinct as are those of the stomach and named by the writer the upper and lower pylorus respectively. The mucous surface of the sigmoid is perfectly distinct in its appearance and functions. The lower end of the sigmoid is naturally and normally prolapsed to a definite extent into the rectum and protrudes into the rectum as the os uteri does into the vagina. In inflammatory states of the bowel the prolapse is increased, and the sigmoid protrudes into the rectum for two or three or more inches. Between recurrences of attacks the prolapsed sigmoid is usually in a state of œdema, and should constipation to any degree prevail—a common sequence of post-dysenteric conditions—the œdema increases, and the passage of a hard motion lacerates the œdematous surface and causes excoriations, which develop into ulcerations with accompanying hæmorrhage and mucus.

The seat of trouble in all such cases is situated in the sigmoid flexure. It is in the lower two inches of the sigmoid flexure that post-dysenteric lesions abide. There in all recurrences congestion, ulcerations, excoriations, sub-mucous "pin-head" hæmorrhages, are to be found. The sigmoid flexure will always be found intussuscepted into the upper part of the rectum, causing the tenesmus

which is present. The tenesmus of dysentery is caused by this prolapse of the sigmoid into the rectum. The indication of the necessity to go to stool is occasioned by the fæces reaching and passing through the lower pylorus of the sigmoid. This point is the dial of the desire to go to stool. This is proved in several ways: (1) When the sigmoidoscope reaches and is being passed from the rectum into the sigmoid the patient always calls out "Look out! I'm going to have a stool." (2) The writer has found when a left inguinal colotomy has been done, and a tube is passed through the opening in the left groin downwards to the rectum, the patient has the same feelings of desire to go to stool. When therefore the sigmoid is prolapsed and pushes its way into the rectum, the feeling of the desire to defæcate is present, and the patient, with this feeling engendered by the prolapsed bowel in the dial for defæcation, always imagines there is more excretion to come and persists in straining. It is the prolapsed bowel, not a fæcal (or blood and mucus) collection at the fæcal dial that is present. Tenesmus is therefore a mere mechanical factor in dysentery. The continued prolapse at this seat is not infrequently followed by malignant trouble. Here is a common seat of cancer in the lower bowel in ailments not of dysenteric origin, but only once has the writer seen cancer at this point following post-dysenteric lesions.

The sigmoidoscope is the only means we have vouchsafed to us to diagnose ailments in this region. Digital examination of the rectum is useless as the region affected is beyond the reach of the finger. Once this is seen by sigmoidoscopic examination the treatment is simple: Dipping the rounded head of stem (trocar) of the instrument into pure carbolic it is introduced along the cannula to the seat of the lesion and then the whole instrument withdrawn. One such application of the carbolic is usually sufficient if the extent of the ulceration is limited, but if the lesion is more extensive, involving three or four inches of the upper part of the rectum as well, a second application may be necessary. If the diseased surface is not due to cancer, syphilis or tubercle (the two last named seldom present lesions so high up the bowel) the improvement is usually instantaneous and no further treatment may be required. With the treatment, however, we are not concerned at present. We set out to show that without examination by the sigmoidoscope it is impossible to say whether a recurrence of the ailment is likely to take place or not; but after repeated microscopic examination of the fæces (preferably taken from high up the bowel through the cannula of the sigmoidoscope) shows that there are no cysts, ova, anæbæ or other incriminating organisms, that there is no œdema of the passage and that the sigmoid flexure is not abnormally prolapsed into the rectum, the patient may be regarded as fit to proceed to the Tropics with a justifiable hope that no recurrence will occur.

J. CANTLIE.

Annotations.

Gangrene from Malaria (H. Alamartine, *Presse Médicale*, August 21).—Three cases of obliterating endarteritis, with gangrene, were all evidently of malarial origin. The patients were soldiers in the *armée d'Orient*, and two recovered after amputation of the leg involved. The amputation came too late to save the third. In this latter case alone the malaria was the primary invasion. These cases teach the necessity for suspecting malaria in cases of extensive gangrene which otherwise might be classed as the work of syphilis or old age. He knows of a total of fifteen cases of the kind at the Macedonian front. The gangrene may be dry and slowly progressive or it may develop rapidly, with grave toxic infectious phenomena, or it may resemble Raynaud's disease and be mistaken for trench foot. In this latter form quinine may cure, but in the other forms quinine seems powerless, and no time should be wasted on it. Armed expectancy is justified in the slow, dry gangrene cases, but immediate amputation is demanded with grave toxic-infectious manifestations. All in this group died when amputation was deferred, while one patient with an extremely grave clinical picture recovered after the prompt, high amputation, pushing quinine at the same time.

Angina Pectoris and Syphilis (O. Josué, *Paris Medical*, ix, 27).—Persons who have had true angina pectoris gave a positive Wassermann response only in 33 per cent. These negative findings were contradicted, however, by the success of treatment as for syphilis. There were no further attacks after specific treatment in 90 per cent. of positive cases. In a few there was slight return of the pains later, but they subsided anew on resumption of treatment. Arsphenamin does not answer; it may bring on serious disturbances with aortic lesions. Best results followed mercurial treatment in minute doses, alternate days, a series of fifteen. This is a vigorous and yet cautious treatment. Angina pectoris seems thus to be an almost certain sign of syphilis even in the entire absence of other stigmata of inherited or acquired syphilis.

Among the very few Allied medical officers who have been awarded British decorations we note the name of Dr. Aldo Castellani, during the war Lieutenant-Colonel in the Italian Medical Service (Naval Branch), and at present Lecturer at the London School of Tropical Medicine. He has been honoured with the Companionship of the Order of St. Michael and St. George, being accorded the right of wearing the insignia and placing the initials of the Order after his name.

Reviews.

THE AMOEBAE LIVING IN MAN; A ZOOLOGICAL MONOGRAPH. By Clifford Dobell, M.A., F.R.S. Published for the Medical Research Committee by John Bale, Sons and Danielsson, Ltd. 1919. 7s. 6d. net.

Mr. Clifford Dobell is to be heartily congratulated on this notable work.

It is remarkable for the excellence of its English, the clarity of its exposition, the severity and justness of its criticisms and the great care with which it has been compiled. The author has not been content with second-hand observations. We have here a record of his own work and in consulting the literature he has, whenever possible, read the original book or paper. One cannot fail to be struck by the wide knowledge displayed, by the industry which has been shown in the reference work, by the evidence of a mastery in technique, and by the artistic skill which has furnished the fine plates with which the volume is embellished.

On concluding the book, which is a pleasure to read, many will no doubt think it a pity it did not appear in the early stages of the late war. It would have prevented many mistakes and much futile discussion. Unfortunately it could not have appeared at that period, for it is in a large measure a product of the war itself. It needed this war with its attendant dysentery to show the state of chaos into which the subject of the amoebae living in man had fallen and to furnish Mr. Dobell and others with the material of which he has made such good use.

Even during the war the question of the human amoebae had suffered sorely from the excursions of amateurs into the faecal field and it is well that this authoritative volume has appeared. It is a credit to British protozoology and will prove a safe guide to those studying a difficult subject which, however, it must be remembered can only be mastered by practical experience.

After a brief preface the author in an introduction explains how some twelve years ago he was led to take up the study of the amoebae which live in man, a study which soon constrained him to believe that Schaudinn's conclusions, then generally accepted, were for the most part incorrect. While he controverted these erroneous views in his lectures at the Imperial College he did not do so in print, recognizing that the mere study of the literature was an insufficient basis for publishing anything on the subject and realizing that it was essential to study not only the parasitic but the free-living amoebae. The war gave him a great opportunity of studying all the intestinal protozoa of man and he worked under the aegis of the Medical Research Committee from the end of 1915 onwards, for the most part at the Wellcome Bureau of Scientific Research, London. He acknowledges his indebtedness to Colonel Wenyon, Dr. Dale, Dr.

Stevenson and others, and concludes with a very quotable sentence from John Locke embodying advice which he certainly appears to have carefully followed: "Truth needs no recommendation and error is not mended by it; in our enquiry after knowledge, it little concerns us what other men have thought."

A chapter entitled "A Note on Material and Methods," which contains a useful warning against forming conclusions the result of work on inadequate quantities of material of poor quality, is followed by a most interesting but very critical review of our present state of knowledge as regards the amœbæ living in man. This review and the succeeding chapter on the genera of these amœbæ are largely of an historical nature and show how true is the statement that it is often more difficult to establish a truth than to perpetuate an error.

Naturally the intestinal amœbæ of man receive chief consideration in this review and it is stated that these were first discovered by Lewis and Cunningham in India, who, however, principally studied what is now known as *Entamoeba coli*. To Lösch is due the recognition of *Entamoeba histolytica*, though apparently he did not appreciate its true significance.

By the year 1897, thanks chiefly to the labours of Italian workers and of Quincke and Roos; the main facts necessary for understanding the relation of amœbæ to dysentery had been discovered. Thereafter, however, as the author clearly shows, a pall of darkness enveloped the subject owing to the confusion into which it was thrown, largely as the result of Schaudinn's researches. The work of earlier observers was forgotten and what he said was accepted as gospel, although there was only one fundamental point on which he was not mistaken, i.e., the existence of two different amœbæ, the one pathogenic, the other harmless, and both inhabitants of the human bowel. His malign influence is traced by the author down to the year 1911 when E. L. Walker in the Philippines began to put matters on a sound basis and finally, along with Sellards, brilliantly solved all the chief problems connected with the relation of amœbæ to dysentery.

Since then there has been no great addition to our knowledge but there have been relapses and mistakes, which are briefly indicated.

The question of nomenclature and the classification of amœbæ into genera forms a chapter suitably concluded by the following synopsis, which includes all the genera and species of undoubted amœbæ at present known as living in man.

Genus I. *ENTAMOEBÆ* Casagrandi and Barbagallo, 1895.

(nec *Endamoeba* Leidy, 1879.)

Synonyms:

Poneramoeba Lühe, 1908.

Lüschia

Chatton and *Lalung-Bonnaire*, 1912.

Viereckia

Proctamoeba Alexieff, 1912.

[*Amoeba* (pro parte), *Endamoeba*, *Entamoeba*,

Endameba, *Entamöba*, Auctt.].

Type: *E. coli* (Grassi) Casagrandi and Barbagallo.

Species in Man: *E. coli* (Grassi) Casagrandi and Barbagallo.

E. histolytica Schaudinn (emend. Walker).

E. gingivalis (Gros) Brompt.

Genus II. *ENDOLIMAX* Kuenen and Swellengrebel, 1917.

Only species, hence type: *E. nana* (Wenyon and O'Connor) Brug.

Genus III. *IODAMOEBÆ* nov. gen.

Only species, hence type: *I. bütschlii* (Prowazek) Dobell.

Genus IV. *DIENTAMOEBÆ* Jepps and Dobell, 1918.

Only species, hence type: *D. fragilis* Jepps and Dobell.

In his consideration of individual species the author gives pride of place to *Entamoeba histolytica* and again, but in greater detail, enters into questions of history and nomenclature regarding it. The passages dealing with these matters are exceedingly well written, far from dry, and will be found most instructive by those who have in the past tried in vain to comprehend the confused and contradictory accounts to be found in the literature. It is remarkable how simple the problem becomes in the hands of an expert and how wonderfully it has been camouflaged by inexperienced or careless workers. Dobell's conclusions regarding the nomenclature of the dysentery amœbæ are as follows:—

The name used for the dysentery amœba of man should be *Entamoeba histolytica* Schaudinn, 1903, as this is the first zoological name correctly given to this species, and the only one which can now be used without creating confusion. The names *Entamoeba coli* or *E. dysenteriae* should in no case be employed. The former can be justified, from the standpoint of nomenclature, but not from that of common sense. The latter name has no status in zoological nomenclature.

His description of *Entamoeba histolytica* is confined to its chief characters and is much aided by the coloured and black and white plates, though unfortunately in Plate I, fig. 1, the process of reproduction adopted has failed to bring out the character of the area between the karyosome and the peripheral layer of the nucleus of the active form. It is, however, well shown in the somewhat similar but differently stained figure in Plate II and in some of the figures forming Plate III.

Stress is laid on the necessity of recognizing degenerate forms. Descriptions of these, and more especially of their nuclei, abound in the literature and have been a fruitful source of error and dispute. As the nucleus of *E. histolytica* is very characteristic the author describes it with great care and points out that the position of the karyosome in the nucleus is an important point. In typical healthy individuals it lies at the centre.

It is interesting to note that Dobell confirms the view put forward by Wenyon and O'Connor as to the diagnostic significance of ingested red blood corpuscles. He states that "it is probably safe to assume that any amœba found in the human stool is *E. histolytica* if red corpuscles are present in its protoplasm." The simple life-history of the amœba is mentioned, reference being made to the precystic and cystic forms and attention directed to the fact that in secondary infections of organs the amœbæ are always of the active form, precystic amœba

and cysts being confined to the intestinal contents. Hence an amœba which has migrated from the bowel is doomed so far as further development is concerned.

Habitat and the Mode of Nutrition are duly considered and then the question of pathogenesis is briefly discussed. Apart from the well-known local (intestinal) and secondary disorders the author describes "Generalized effects resulting from the destruction of the lining of the bowel, but not manifested as local intestinal diseases (General Amœbiasis)." Although the definition is clear the term "General Amœbiasis" is not a good one. The author is not to blame for it as he has merely adopted it from medical literature, but there can be no doubt it is misleading and that it should be abandoned.

Carriers receive special attention and the term "cyst-carrier" is deprecated, Dobell pointing out that the carrier is a carrier of amœbæ from which the cysts are derived. The recent work on carriers is quoted and the persistence of infections with *E. histolytica* noted.

To the protozoologist an important section is that dealing with Multiplication. The only form of reproduction Dobell recognizes is equal binary fission and a careful account of his observations on this phenomenon is given, supplemented by illustrations showing the process in detail. It is apparently the first time that all the stages have been studied and the opportunity is taken of criticizing previous work on the subject and of demolishing the theory of multiple fission or schizogony described by Job and Hirtzmann. The process of encystment is explained and made clear by good figures and there is a lengthy account of the cysts, special attention being paid to their chromatoid bodies, their glycogen content, the size of their different races, and the number of their nuclei.

For details the original must be consulted and will well repay careful perusal. Medical officers will be interested in the statement that the cysts of *E. histolytica* will survive for several weeks outside the body of man if they are kept moist and cool. The longest period noted by Dobell was five weeks. Excystation with the early stages of development has so far not been discovered although along with Dr. Dale the author carried out experiments on kittens in an attempt to do so. Other efforts in this direction are recorded and commented upon but all that is definitely known is that the cysts hatch in the small intestine.

There appears to be no difference in the virulence of different races of *E. histolytica*, any difference in the effect produced being explicable in terms of the resistance or susceptibility of the host. This has been substantiated by experiments both on man and animals. There is no evidence in support of the hypothesis that *E. histolytica* can, like *E. coli*, exist as a harmless commensal in the bowel. It is dependent on living tissues for its nourishment and is very unlikely to alter its diet and feed on bacteria and gut contents. *E. histolytica* in the amœboid state never contains bacteria though they

may be present in dead or dying amœbæ. Parasitization by bacteria, quite a different thing from ingestion, may occur. Dobell has studied three such infections and illustrates one of them, while there is also a figure of a parasitized amœba studied along with Dr. A. C. Stevenson.

Of the other points considered in relation to *E. histolytica*, i.e., sexual phenomena (denied), animal infections, dissemination, cultivation, treatment and geographical distribution, only one or two points can be here mentioned.

Dobell regards drinking water and flies as probably common vehicles of infection and though he does not enter fully into the question of treatment refers to the action of emetine which, as he and Dale showed, is exerted not on the parasite but on the host.

Entamœba coli is next considered, the same plan being adopted. The section on history and nomenclature is very illuminating and must have necessitated an intensive study of the literature. The description of the amœboid form is careful and clear and it is noted that this amœbæ, unlike *E. histolytica*, never extrudes clear, blade-like pseudopodia. Its colour is distinct from the amœba of dysentery, the latter being whitish, *E. coli* greenish, a difference which, though slight, can be seen when individuals of the two species are viewed side by side. The importance of the nuclear characters in distinguishing this harmless commensal from *E. histolytica* is insisted upon and the author thinks that most of the published descriptions and figures of the parasite have been drawn from more or less degenerate specimens.

It should be remembered that the karyosome is eccentrically placed in the nuclei of *E. coli*.

Other points, such as the presence of glycogen in the young cysts, the "splintered glass" appearance of the chromatoids in the cysts and the question of the cyst nuclei, can only be mentioned in a review of this kind.

The amœba of the human mouth is an entamœba, *E. gingivalis*, and the account given of it clears up much that was previously confusing and difficult. The author finds there is nothing to show that it is in any way pathogenic.

Although it had been seen before and recognized by Wenyon as a distinct species, *Endolimax nana* owes its emergence from obscurity to the war and the reviewer remembers suggesting to Colonel Wenyon the specific name "nana" for this small amœba, which the latter was then studying in Alexandria. The generic name introduced by Brug, though inappropriate, for *E. nana* does not resemble the free-living "*Amœba limax*," must apparently be accepted as it conforms to the rules of nomenclature.

It is treated in the same way as the other amœbæ and stress is laid on its characteristic vesicular nucleus with a peculiar karyosome, very protean in form. The exact site of infection of the bowel has not so far been determined but there is no evidence that *E. nana* is in any way pathogenic. Its occasional parasitization by a micro-organism

belonging to the genus *Sphaerita* is mentioned and the striking appearances presented by the invaded amoebæ are illustrated. Apparently this parasitization does not harm the host cells.

There is a good description of *nana* cysts, supplemented by excellent drawings, and attention is drawn to the fact that they may contain inclusions resembling rods and granules. When these are of a filamentous nature the cysts may be mistaken for the small cysts of lamblia, a point well brought out in Plate II, fig. 28.

E. nana is so frequently present in the human bowel that it is essential for anyone examining for human intestinal protozoa to be familiar both with its active and cystic forms. Though such knowledge can only be obtained by practical experience with the microscope, the account given by Dobell together with the drawings will materially aid the worker.

The same is true as regards *Iodamoeba bütschlii*, the next amoeba considered, the cysts of which, known as iodine bodies, brought it into prominence. These "I-bodies" or "I-cysts" were regarded by Wenyon as probably of a vegetable nature. The active form of the amoeba had undoubtedly been seen before, but there was no satisfactory account of it and it was left to Dobell and his assistant, Miss M. W. Jepps, to rescue it from obscurity and to determine its true relation to the "I" bodies. Dobell named it "*Iodamoeba*" and describes it fully. It is a small amoeba intermediate in size between *E. coli* and *E. nana* and closely resembles a small *E. coli*. Its nucleus, however, serves to distinguish it, for there is no beaded ring as in *E. coli*. The nuclear characters are indeed important and are carefully noted.

The cysts of this amoeba are very remarkable owing to the frequency with which they present an irregular outline, well indicated in text-fig. 2, the presence in them of peculiar granules, possibly consisting of volutin, and the glycogen inclusions which they contain and which strike brown with iodine, hence the name "I-cysts."

As regards the remarkable forms often assumed by these cysts Dobell advances the hypothesis that the strange shapes may be due to mutual pressure, the amoebæ being crowded together in the crypts of the large intestine at the time of encystation. The cysts are unencysted and undergo no further development outside the human body.

I. bütschlii is almost certainly non-pathogenic but very frequently occurs along with *E. histolytica*. Although it seems to live on intestinal contents it promptly disappears under emetine treatment, as does the tissue parasite *E. histolytica*. This is very puzzling in view of the fact that emetine appears to act primarily on the host and not on the parasite and Dobell is unable to furnish an explanation. *A priori* one would imagine that it should behave like the harmless commensals *E. coli* and *E. nana*, which are emetine-resistant.

Dientamoeba fragilis, the last of the amoebæ dealt with, was probably discovered by Wenyon in 1909, but was re-discovered independently by the author

and Miss Jepps in 1917. It is a very small amoeba and is remarkable in being bi-nucleate.

No cysts have been found and in this respect it resembles *E. gingivalis*. There is nothing to show that it is pathogenic and no known method of treatment affects it.

Chapter IX is devoted to a consideration of the amoebæ found in human urine, in dogs and in monkeys. Dobell thinks that Walton's case of urinary amoebiasis, reported from India in 1915, is the only one which can be regarded as genuine. It appears to have been a true secondary infection of the urinary tract with *E. histolytica*. The dog, like the cat, is susceptible to infection with this parasite and may suffer from liver abscess.

It is probable that the Entamoebæ of monkeys are similar to those of man; at any rate, these animals almost certainly harbour *E. coli* and *E. histolytica*.

The last chapter, by no means the least interesting and least critical, is concerned with other amoeboid organisms described from man. After its perusal one can only marvel at what has been done in the name of science and wish that other observers had displayed the same care and assiduity as the author of this remarkable book. It may be said that the latter is well printed, that there are very few mistakes in the text, that the illustrations, apart from the small deficiency noted, are admirable, and that the index is adequate. It is claimed for the bibliography, which does not pretend to be complete in the widest sense of that word, but which nevertheless contains 328 references, that it has been compiled with great care. This is self-evident and it will be invaluable to future students of this subject on which Mr. Clifford Dobell has shed so much light and to which he has devoted so much time and learning.

Correspondence.

To the Editor of the JOURNAL OF TROPICAL MEDICINE AND HYGIENE.

SIR,—I was much interested in Surgeon-Captain Bassett-Smith's note, published in your last number, on the presence of trypanosomes in the young of infected animals. I am able to confirm his observations as to the passage of *Trypanosoma rhodesiense* through the placenta to the fetus in rats. I have sections of a fetal rat (nearly full time) showing trypanosomes universally present throughout the fetus, but most numerous in the spaces in the areolar tissue. Comparatively few forms are seen in the blood-vessels.

In one case of pregnancy in a guinea-pig infected with *Trypanosoma nigeriense*, inoculation taking place soon after coitus, the young one was born in a healthy state, and showed no trypanosomes in the blood. Later on it proved as susceptible to infection with this strain as its mother had been.—I remain, &c.,

A. C. STEVENSON, M.B., D.P.H.

Wellcome Bureau of Scientific Research.

November 12, 1919.

Original Communication.

A CASE OF BRONCHO-SPIROCHÆTOSIS
(CASTELLANI'S BRONCHITIS).By Major W. BROUGHTON-ALCOCK, R.A.M.C.,
11th General Hospital, I.E.F.

This condition, first discovered by Castellani in Ceylon in 1905, has also been found by him to be not rare in the Balkans. His own work and experience, and that of others, are given in his interesting article in the *JOURNAL OF TROPICAL MEDICINE AND HYGIENE*, 1917. (Castellani, "Notes on Tropical Diseases met with in the Balkans and Adriatic Zones," *JOURNAL OF TROPICAL MEDICINE AND HYGIENE*, July 16; August 1, 1915; September 1, 1915; October 1, 1917.)

Later, Violle in Toulon has found twenty cases, and has written further interesting results of his researches (*Presse Médicale*, No. 39, 1918; and *Lancet*, December 7, 1918).

Although we have but one case to describe, it is briefly published, as it shows the presence of this disease in Italy and in our Expeditionary Force there. From a clinical aspect the patient presented the signs and symptoms of the subacute form of the disease.

Previous History.—Patient states he had inflammation of lungs when 15 or 16 years old, and was confined to bed for three or four weeks. He was sent to the South of France after this illness, but for many years has suffered with winter cough. There has been no history of tuberculous infection.

Family History.—Good; no history of tuberculosis.

Present History.—Classed C1 in December, 1916. Has done office work since. Reported sick August 17, 1918, complaining of cough and debility, but says he has not been feeling well since November, 1917, and that he was spitting phlegm but no blood, and was losing weight and feeling tired.

Physical Examination.—Examination on August 24, 1918, showed the patient to be very thin and anæmic and with poor chest development; sulci on both sides of his chest. Measurement: inspiration, 32; expiration, 31 inches. Left side of chest flatter than right. Resonance impaired over both apices. Expiration prolonged, and moist sounds heard over left upper lobe posteriorly. The buccal pharynx was pale and showed lymphoid enlargements. No abnormality detected in the other systems.

Five weeks after admission to hospital the patient showed definite improvement in general health and in his pulmonary condition. Following rest in bed he has been up and walking about. The temperature remained normal. There were no night sweats. A Wassermann reaction test carried out on his blood serum was negative. Captain Jones, R.A.M.C. (late Resident Physician, Brompton Hospital), then reported on the pulmonary con-

dition: Impaired resonance left apex; right side of chest moves more freely than left, which is flatter than right. T.V.P. and V.R. are within normal limits on both sides. Fine crepitation can be heard above the left clavicle and coarser crepitations below it. There is now no sputum. Radioscopic examination shows an opacity at the inner side of the left lung.

Laboratory Findings.—On admission there were coughed up each day about 2 oz. of mucus, slightly purulent and of a light brownish colour due to degenerated blood. Certain portions were foamy in character. Polymorphonuclear leucocytes were the most prevalent, but were not abundant; only a rare epithelial cell was seen.

Alternate day examinations showed a gradual lessening of the quantity of expectoration and alteration in character until it became clear and finally ceased.

Careful observation and inquiry lead one to conclude that a small proportion of expectoration came from the upper pharyngeal passage. This was opaque and not bloodstained. The mucus taken from the buccal pharynx was clear, and contained few pus and epithelial cells, and rare spirochætes were seen on staining the firms by Fontana's method. The spirochætes found in the sputum were at the early examinations in considerable numbers, and, concurrent with the improvement of the patient's health and diminution of the amount of sputum, the numbers therein lessened until the sputum ceased. Other micro-organisms were always rare, and no *B. tuberculosis* was found. There was no contamination from the teeth.

Morphologically the spirochætes found resembled those illustrated by Castellani as *S. bronchialis*. They could be readily demonstrated on staining by Fontana's or Leishman's method.

I beg to thank Lieut.-Colonel J. W. West, C.M.G., R.A.M.C., Officer Commanding the Hospital, for his interest in the investigation and for permission to publish this note.

The First Two Cases of Castellani's Broncho-Spirochætositis in the Eastern Districts of France (by SIMON and RADITCH, *Bull. de la Soc. Méd. de Nancy*, Jan. 1, 1919).—The first case is that of a man of 22, who had never been out of France but who was working with Chinese and Moroccan natives. The sputum was negative for the tubercle bacillus but positive for *Sp. bronchialis*. Cured in fifteen days without special treatment. The second patient worked in a factory where he was in constant contact with Orientals. For five days he showed a condition very like influenza, after which pleuro-pulmonary symptoms developed. The sputum was full of spirochætes. The symptoms continued for twenty-five days and then ceased suddenly, but after leaving hospital patient had a relapse which lasted seventeen days.

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CASTELLANI'S BRONCHITIS.

BRONCHIAL PARASITOLOGY.

WHEN Castellani found spirochetes in the sputum in 1905 in a patient in Ceylon, he broached a subject which has already had far-reaching

consequences. His discovery, at first regarded as a curiosity and as a condition confined to Colombo and its neighbourhood, is gradually assuming a significance and a clinical importance of the first magnitude. It is safe to say that one result is that the microscopes in every continent and in every scientific laboratory in these continents are to-day busily engaged in examining sputum for spirochetes and other organisms. Castellani's researches have revived interest in the examination of sputum generally, for, although the discovery of the spirochete in the bronchial mucus has brought the subject of bronchial parasitosis prominently to the forefront, few, and these few confined to tropical practitioners, are even acquainted with the fact that pathological micro-organisms other than tubercle bacilli inhabit the bronchial parts and have their being therein. As long ago as 1880, in North Formosa, Manson found the eggs of the same parasite in two cases, one a Chinaman and the other a Portuguese, both of which had had hæmoptysis and obscure thoracic signs and symptoms. Dr. Ringer of Formosa, and later of Amoy, found in the lungs of one of these patients during a post-mortem examination a parasite which was examined by Cobbold in London, who styled it a *Distoma*, and the parasite was and is still known as *Distoma ringeri*. Several years later (1889) the writer found in Hong-Kong the parasite in question, and during the following four years found it in two other patients. Baelz recognized the organism in Japan in the same year as Manson first saw it, and associated the patient's clinical symptoms with its presence. At that time few men paid any attention to this discovery, and it was looked upon, as is usual with all fresh discoveries of the kind during the close of the last century, as a curiosity and of no clinical importance. Castellani's discovery has, however, met with a different reception. At first, as was to be expected, at a date so early in the century as 1905, the enunciation of spirochetes in the sputum was pigeon-holed in medical literature, and it was not until subsequent observers in many regions, literally from China to Peru, reported the presence of spirochetes that the subject took a foremost place in practical medicine. In the first place it is not a purely tropical nor yet a sub-tropical ailment, for it has been met with in England, France, Switzerland and the Balkans, a fact of the highest interest. The mere mention of these countries would seem to imply that this disease is probably present in any and every country, and it only wants to be looked for to be found. We are so enamoured of all coughs attended by hæmoptysis and mucopurulent sputum being due to tuberculosis that other pathological entities are not thought of, far less searched for. It may be that infection by spirochetes but prepares the soil for tubercle germs to settle upon, and that the invasion by the latter obscures infection by the former.

The chronic bronchitis so common in middle-aged men, and especially women, in Britain may

have its explanation by an infection due to some as yet unsearched for organism, and it may be that spirochætes figure amongst these. A spirochæte of sorts is present in the mouths of many, and although at present were anyone to suggest that there is any connection between the "harmless" spirochæte of the mouth and its pathological cousin in the respiratory tract, he would be looked at askance and considered as a scientific fanatic. In the same vein of thought, he who would attach any importance to the trypanosome in rats as being a possible relative to that of sleeping sickness; or the amœbæ present in a healthy colon as in any way connected with the amœbæ of dysentery, would become a laughing stock to his super scientific neighbours. One forgets that a cancer cell is described as but a normal cell of the body which finds its way into tissues to which it developmentally does not belong, and there acquires characters of malignancy with all its evil consequences, so a spirochæte or allied micro-organism in its proper place remains harmless until it reaches areas and tissues and environment in which it is a foreign element and an invader where it takes on pathological powers of destruction. This may seem an overdrawn picture, and probably is, but the relation of harmless and disease organisms of the same family living side by side gives one to think in a manner not altogether unprofitably. The washerwoman in this country in course of time commonly develops chronic bronchitis in middle age. Daily it may be she has been working in the steam and heat of the laundry, bending over a tub and inhaling the steam or moist atmosphere arising from the washtub. Will the hot, moist atmosphere generate the bronchitis? In the Tropics we have a hot, moist atmosphere, but chronic bronchitis is not common. If infection by spirochætes is more common in tropical climates, where an atmosphere approaching that of our laundries exists, in both places we find a nidus in which organisms, say spirochætes, may live. It would be important to know the employment of persons infected by broncho-spirochætositis in tropical and other countries where this ailment is met with; it would help us in many ways to elucidate this surmise. A foolish suggestion it may be, but if it induces more observers to examine the sputum of all afflicted with a cough, be its nature what it may, it will further our knowledge in many ways, and lead to results which may cause surprise and help to clear up many points which at present are mysteries.

Spirochætes in the nostrils and in the upper part of the pharynx would cause a catarrh, as it does lower down in the air passages, and even the cause of adenoids might be elucidated by an inquiry of the kind. One has only to turn to the fungi, and especially to the chapter on Fungi Imperfecti in Castellani's and Chalmers's Edition III, just issued, to become acquainted with the number of these found in the mouth, on the tonsil, and in the upper pharynx tract to know the culture ground

they offer to these invaders, and one will become disposed to think if these fungi, some "harmless," some pathological, find refuge there, why may not other extraneous members of the fauna and flora not have their being there also and with more deadly consequences?

Major Alecock's case, in an Englishman, see p. 213 of this issue of the JOURNAL OF TROPICAL MEDICINE, is an historical event in the recognition of spirochætes in the respiratory tract, and it may possibly be, and most probably will be, found to be but a forerunner of many communications of the kind. When Sambon found a case of pellagra in England, it only required a search being made in our lunatic asylums to find many others with this ailment upon them. The hookworm was found when a search was made amongst our miners in this country, and recently malaria has been found amongst men and women who have never left these shores.

If Castellani's discovery will do nothing else than to stimulate a closer examination of the sputum in this and other countries a great good has been done. It will get us off looking upon hæmoptysis with a muco-purulent expectoration as due to the "one and only" possible (?) cause of the affection—namely, tubercle bacilli, and open a new chapter in the diseases of the respiratory tract. If Castellani's voluminous publications and discoveries, from the trypanosome as the ætiological factor in sleeping sickness, to the many lesser but highly important parts played by the fungi in skin disease, have done nothing more stimulating than to show that we must widen our scope of investigation and observation if we are to understand aright the various causes of bronchial and lung troubles of what in Army parlance are styled diseases of unknown origin—then has Castellani not lived in vain.

Annotations.

Hæmorrhagic Bronchitis (Castellani's Broncho-Pulmonary Spirochætositis) (H. VIOLLE, *Lancet*, December 7, 1918).—The author gives the result of his investigations on the subject in the South of France, where he has come across a number of cases.

The diagnosis was based on the presence of large numbers of spirochætes, of the type *Spirochæta bronchialis* Castellani, in the sputum, while there was absence of tubercle bacillus, of hyphomycetes and of ova of *Paragonimus westermani* Kerbert. The author is of the opinion that when a patient presents bloody expectoration while he is in good health the practitioner should be on the look-out for Castellani's bronchitis.

In the author's experience the prognosis is generally favourable. Relapses, however, seem to be frequent.

As regards treatment he is not in favour of any very active therapeutic measures; rest, a nourishing diet and country air being sufficient to bring about a cure. If attacks of hæmoptysis are severe, he recommends tincture of iodine, a few drops well diluted. Arsenic, first introduced by Castellani in the treatment of the malady, is useful in chronic cases.

Dr. Violle is of opinion that attention should be more generally paid to the presence of broncho-spirochætosis in European countries. His researches have shown, for instance, that the malady is far from being rare in France. In cases of patients spitting up blood a correct diagnosis is of great importance; it will relieve the patient's feelings to know that he is not suffering from the dreaded tuberculosis of the lungs. Moreover, a correct diagnosis is of importance from a medico-legal point of view, because in army practice, tuberculosis entails permanent discharge from the army with a pension, while broncho-spirochætosis merely means, in most cases, giving the patient a few weeks or a few months rest, after which he will be able to resume his military duties.

*Recent publications on Broncho-spirochætosis: La Spirochétose Broncho-Pulmonaire à Toulon (Broncho-Pulmonary Spirochætosis at Toulon, par le Doct. Henri Chatrieux. Thèse de Bordeaux. Imprimerie de l'Université. 1919).—*During the war a great many labourers from the Far East were brought into France for various kinds of work at the ports, in the factories, and at the front. A good many were treated in the Toulon hospitals for broncho-pulmonary spirochætosis, a condition hitherto practically or entirely unknown in France but described by Castellani as occurring in Ceylon and elsewhere. They appeared to be suffering from a peculiar form of bronchitis. The general condition was good and the pulmonary symptoms slight, but bloody sputum resembling red-currant jelly rendered the diagnosis obscure. The affection was at first believed to be tuberculosis, but the absence of the specific bacillus after repeated examinations seemed to contradict the supposition. On colouring smears by the nitrate of silver method, spirochætes similar to those described by Castellani were found, sometimes in great abundance. In some instances the condition seemed to be associated with swelling of the parotid glands and some of the patients were originally admitted to hospital for "mumps." The age of the subject would seem to be a factor of some importance, most of the cases seen at Toulon ranging between 25 and 35, and particularly between 28 and 31, though men of from 18 to 50 were treated. The average duration of the condition was a little under a month, but it was sometimes chronic and characterized by periods of latency of some considerable length. Cases were subsequently observed among European soldiers and sailors who had lived in contact with these labourers.

*A Note on Castellani's Broncho-Spirochætosis (by E. Pringault and R. Mercier, Marseille Médical, June 15, 1919).—*Description of the case of a young man who had never left France, who suffered from hæmoptysis and had been discharged from the army for tuberculosis. The sputum was characteristic, being muco-purulent, opaque, reddish and very sticky; it contained no tubercle bacilli, but *Sp. bronchialis* were present in large numbers. Fresh sputum should be used for the purpose of examination, as the spirochætes dissolve very rapidly.

*Kidney Symptoms in Prisoners of War (H. Mallié, Journal de Médecine de Bordeaux, August 10).—*During his stay at the prison camp of Alten-grabow in Prussia, where there were 12,000 Russian and 12,000 French and Belgian war prisoners stationed, he took notes of 404 cases of kidney disturbance among the men. The actual number was much larger than this. The only explanation possible for the facts observed, he says, is to assume a toxic action from spoiled meat and spoiled canned goods. The cooking killed the germs, but did not destroy their toxic products.

Abstract.

BILHARZIASIS TREATED BY INTRA- VENOUS INJECTIONS OF ANTIMONIUM TARTARATUM.¹

By GEORGE C. LOW
AND
H. B. G. NEWHAM.

ONE of us (G. C. L.) published in May, 1919,² the details of a case of bilharzial disease treated by the new method of intravenous injections of antimony tartaratum (tartar emetic), first proposed by McDonagh and subsequently amplified and carried out on a large scale by Christopherson in Egypt. Since that date the latter observer, in conjunction with Dr. J. R. Newlove, has published laboratory and other notes on seventy cases of the disease treated at the Khartoum Civil Hospital. The beneficial results of the treatment are well brought out in that paper.³

As regards the case just mentioned (Dr. Low's case), further examinations were carried out during the month of May, 1919, with constantly negative results, no further appearance of blood or ova taking place. At the same time, all clinical signs, such as pain in the back, &c., completely disappeared, and the patient sailed for South Africa on May 29, perfectly satisfied in his own mind that he was completely cured.

¹ Abstracted from the *Lancet*, October 11.

² *JOURNAL OF TROPICAL MEDICINE AND HYGIENE*, May 15, 1919.

³ *Ibid.*, July 15, 1919.

We have now had the opportunity of studying a further series of cases of the disease, and as the results have again been excellent we think it advisable to publish them at once, as they confirm Dr. J. B. Christopherson's Egyptian experience in every way. It is important, therefore, that all bilharzia cases should have the chance of such treatment, as up to the present no drug has been known that has any specific action on the infection. Many have, it is true, been employed, but, at the best, those have only been palliative, if even that.

DETAILED RECORDS OF FIVE CASES.

The following are the records of our cases. For numbers 4 and 5 we are indebted to Dr. C. W. Daniels, under whose care these patients were, and we have to thank him for his kind permission in allowing us to incorporate them in the series:—

Case 1.—Born and lived in Natal till the war broke out, then served in German South-West Africa and in German East Africa for about eighteen months in all. Came to England in 1918. Discharged on account of bilharzial disease December, 1918.

Present Illness.—Got bilharzial disease as a boy of 12 in Natal. Bathed in pools of rivers with other young boys. Fairly bad infection. Little or no improvement as he grew up. In East Africa became very bad, passing a lot of blood. Has continued about the same since. Generally passes a large quantity of blood. Pain in small of back on doing any exercise; also gets tired very easily.

Examination.—Apart from his urinary trouble no other signs of disease. Lungs perfectly healthy, heart sound. Urine, much blood, many terminal-spined eggs, albumin present; evidently from the blood; no casts. Blood, differential leucocyte count, P.M.N. 44, L.M. 12, L. 24, E. 20. After observing the patient for some days he was put on a course of antimonium tartaratum intravenously and stood those well.

CASE 1.

Date 1919	Drug A.T.	Blood	Ova
April 24	—	Yes	12 to a field
" 25	—	"	10 "
" 26	—	"	8 "
" 28	½ gr.	"	7 "
" 29	—	"	5 "
" 30	—	"	1 "
May 1	½ gr.	"	6 "
" 2	—	"	Nil
" 3	—	"	1 to a field
" 5	1 gr.	"	1 "
" 6	—	"	Becoming scanty
" 7	—	Trace	1 in 12 fields
" 8	1 gr.	Yes	1 in 6 fields
" 10	—	"	Very difficult to find
" 12	1½ gr.	Trace	Very scanty
" 13	—	No	Eggs very scanty
" 14	—	"	"
" 15	1½ gr.	"	Eggs more numerous
" 16	—	"	Eggs very scanty
" 17	—	"	"
" 19	2 gr.	"	2 ova. C. 1
" 20	—	"	No ova. C. 1
" 21	—	"	" C. 2

Date 1919	Drug A.T.	Blood	Ova
May 22	2 gr.	No	No ova. C. 2
" 23	—	"	" C. 1
" 24	—	"	" C. 2
" 26	2 gr.	"	" C. 1
" 27	—	"	" "
" 28	—	"	" C. 2
" 29	2 gr.	"	" "
" 30	—	"	" C. 1
" 31	—	"	" C. 2
June 2	2 gr.	"	" "

Stop injections for present. Total 16 grs.

Date	Drug A.T.	Blood	Ova
" 4	—	No	No ova. C. 1
" 5	—	"	" "
" 6	—	"	" C.
" 7	—	"	" "
" 10	—	"	" "
" 11	—	"	" "
" 12	—	"	" C. 2
" 13	—	"	" C. 1
" 14	—	"	" "
July 7	—	"	" C.
" 17	—	"	" "
" 21	—	"	" "

Abbreviations used.—A.T. = antimonium tartaratum (an intravenous injection). C. = a centrifuged specimen. The numerals after C. = the number of specimens made from the deposit. When the deposit became very small in amount, all could be examined under one cover-slip, this would read C. 1, if more required then C. 2, 3, &c. C. by itself a centrifuged specimen, all the deposit examined under one cover-slip.

Remarks.—April 26th: No centrifuging. 26th: Now in bed. 30th: No centrifuging. May 1st: Faeces negative. 8th: Faeces negative. 15th: Rigor and felt seedy after injection. 19th: Began centrifuging the deposit to-day. 31st: P. 44, L.M. 14, L. 30, E. 12. June 5th: Seems quite cured. 14th: Left hospital to-day for a holiday. July 7th: Last drops cloudy, due to spermatid fluid. Came back from his holiday to-day. All symptoms disappeared. No pain in back or elsewhere. 21st: Urine clear, no deposit.

Case 2.—Born at Norwich. Went to Egypt, October, 1915, and was there till June, 1917, when invalidated home for bilharzial disease. Used to bathe in a prepared swimming bath; not in canals or ponds. Walked in canvas shoes over irrigated fields frequently.

Present Illness.—February, 1917, began to pass blood at end of micturition, pains in the back and tired feeling. The urine was then examined and bilharzia ova found. He was treated by urotropine and by rectal injections of collosol argentum. As he was not improving, was sent to England. Has been at work in a bank since, but as condition was getting worse was sent into the Albert Dock Hospital for treatment.

Examination.—Apart from bladder, systems all normal. Urine: much blood, and many terminal-spined bilharzial eggs. A fair amount of albumin, no casts, epithelial cells numerous. Faeces negative.

CASE 2.

Date 1919	Drug A.T.	Blood	Ova
April 24	—	Much	6 to a field
" 25	—	"	6 "
" 26	—	Less	4 "
" 28	½ gr.	"	5 "
" 29	—	Same	4 "
" 30	—	More	5 "
May 1	½ gr.	Much	1 "
" 2	—	"	7 "

Date	Drug A.T.	Blood	Ova
May 1919			
3	—	Less	1 to a field
5	1 gr.	—	7
6	—	More	Becoming scanty
7	—	Much	1 in 12 fields
8	1 gr.	Less	1 in 6 fields
10	—	Little	No ova
12	1½ gr.	—	—
13	—	—	Very scanty
14	—	More	—
15	1½ gr.	Little	More numerous
16	—	Trace	Very scanty
17	—	No	—
19	2 gr.	—	No ova C. 1
20	—	—	1 ovum C. 1
21	—	—	No ova C. 2
22	2 gr.	—	1 ovum C. 3
23	—	—	1 " C. 1
24	—	—	No ova C. 1
26	2 gr.	—	—
27	—	—	1 ovum C. 1
28	—	—	No ova C. 2
29	2 gr.	—	C. 1
30	—	Trace	C. 2
31	—	No	1 ovum C. 1
June 2	2 gr.	—	No ova C. 1

Stop injections for present. Total 16 grs.

4	—	No	No ova C. 2
5	—	—	C. 1
6	—	—	C.
7	—	—	"
10	—	Yes *	No ova
11	—	Yes	Few ova

Condition not cured. Go on with more A. T. injections.

12	2 gr.	Yes	No ova C.
13	—	Trace	—
14	—	No	—
16	2 gr.	—	—
17	—	—	—
18	—	—	—
19	2 gr.	—	—
20	—	—	—
21	—	—	—
23	2 gr.	—	—
24	—	—	—
25	—	—	—
26	2 gr.	—	—
27	—	—	—
28	—	—	—
30	2 gr.	—	—
July 1	—	—	—
2	—	—	—
3	2 gr.	—	—

Stop injections again. Total 30 grs.

4	—	No	No ova C.
5	—	—	—
7	—	—	—
8	—	—	—
9	—	—	—
10	—	—	—
11	—	—	—
12	—	—	—
14	—	—	—
Aug. 8	—	—	—

* Blood in last drops. Cells like kidney and bladder epithelium.

Remarks.—April 24th: 2/3 in. field. 26th: Is now in bed. 28th: Faeces negative. May 1st and 8th: Faeces negative. 13th: A little upset after injection. 14th: A good lot of albumen in urine. 17th: Albumin, faint trace. 19th: Began centrifuging to-day. 26th: Albumin, only faint trace. 31st: P. 58, L.M. 6, L. 22, E. 14. June 5th: A few pus cells about still. Otherwise appears cured. 10th: Has complained from time to time of pain in left kidney; ? a stone. 11th: Ova dead, perhaps just a clump came away. 30th: A lot of epithelial cells in urine to-day, evidently being cast from healing ulcer.

July 3rd: Spermatozoa and a few cells. 5th: A few epithelial cells. 7th: P. 49, L.M. 10, L. 28, E. 13. 10th and 14th: Perfectly clear urine. 15th: Left hospital.

Case 3.—Went to Egypt January, 1916. Sent home for bilharzial disease February, 1919.

Present illness.—First noticed pain on passing water December, 1916. Then in January, 1917, blood appeared and pain in region of kidneys. Urine examined and terminal-spined bilharzial ova found. Went on serving in Egypt till February, 1919. In hospital with the condition three times. Passed a lot of blood when in Egypt. Since returning to England not so much. No treatment since coming home. Has not had antimony.

Examination.—Anæmic-looking; teeth good. Systems, heart and lungs nothing abnormal. Abdomen, nothing to note, no special tenderness over bladder. Urine, blood and a fair number of bilharzial ova (terminal-spined). Faeces, negative.

Case 4.—When war broke out he went to the Cameroons with the Army, and returned to England from there June, 1916.

CASE 3.

Date	Drug A.T.	Blood	Ova
May 1919			
15	—	Yes; not much	Scanty
22	½ gr.	Fair amount	4 to a field
23	—	Yes	No ova
24	—	Yes; less	4 ova. C. 1
26	½ gr.	"	4 " "
27	—	Yes	3 " "
28	—	No	1 ovum. C. 1
29	1 gr.	Trace	2 ova. C. 1
30	—	—	No ova. C. 2
31	—	No	4 ova. C. 1
June 2	1 gr.	Trace	1 ovum. "
4	—	—	No ova. "
5	1½ gr.	—	C. 2
6	—	—	C. 1
7	—	No	" "
10	2 gr.	—	" "
11	—	—	" "
12	2 gr.	—	" "
13	—	—	C. 2
14	—	—	" "
16	2 gr.	—	No ova. C. 1
17	—	—	C.
19	2 gr.	—	" "
20	—	—	" "
21	—	—	" "
23	2 gr.	—	" "
24	—	—	" "
26	2 gr.	—	" "
27	—	—	" "
28	—	—	" "
30	2 gr.	—	" "
July 1	—	—	" "
2	—	—	" "
3	2 gr.	—	" "

Stop injections. Total 20½ gr.

4	—	No	No ova. C.
5	—	—	" "
7	—	—	" "
10	—	—	" "
14	—	—	" "
17	—	—	" "
21	—	—	" "
28	—	—	" "

May 23rd, 26th, 28th: Faeces negative. 31st: P. 48, L.M. 2, L. 36, E. 14. July 7th: P. 54, L.M. 5, L. 29, E. 12. Coming up as an out-patient now.

Present Illness.—The first symptoms complained of were an uncomfortable feeling in the abdomen in the mornings, this being relieved by the passage of feces. Blood and mucus were then present in his stools, and a diagnosis of colitis was made. Diet and rest did not improve the condition. He returned to West Africa in October, 1916. During the winter the condition gradually got worse, and in March, 1917, he went into hospital. Emetine injections were then given with some clinical improvement, but a relapse with much blood and mucus again appeared in October, 1917. A faecal examination then showed lateral-spined bilharzial ova. He remained in much the same condition till coming to England in November, 1918. Since being in England he has complained of lassitude and loss of weight, with mucus in the stools but no visible blood. The number of stools has varied from one to three a day. He was admitted into the Albert Dock Hospital on June 6, 1919.

Examination.—Nothing abnormal noted apart from the condition of the faeces. Urine, no albumin, blood, or sugar. Faeces, mucus, no blood. Microscopically lateral-spined bilharzial ova in small numbers.

CASE 4.

Date 1919	Drug A.T.	Faecal examinations
June 11	...	3 ova
" 12	1/2 gr.	1 ovum
" 13	...	3 ova
" 14	...	Nil
" 16	1 gr.	2 ova
" 17	...	1 ovum
" 18	1 1/2 gr.	Nil
" 19	...	"
" 20	...	4 ova
" 24	2 gr.	Not examined
" 25	...	Nil
" 26	...	1 ovum degenerated
" 27	2 gr.	2 ova degenerated
July 1	"	Not examined
" 3	"	Nil
" 4	2 gr.	"
" 5	...	1 ovum
" 6	...	Nil
" 7	2 gr.	"
" 8	...	"
" 9	...	"
" 11	2 gr.	1 ovum degenerated
" 12	...	"
" 15	2 gr.	Nil
" 16	...	"
" 18	2 gr.	"
" 22	"	"
" 23	"	"
" 24	...	"
" 25	Discharged	"
Total 21 gr.		

Note.—Unless otherwise stated eggs were apparently healthy. On the occasion of each microscopic examination three slide preparations were carefully searched and the numbers recorded are the total number of eggs in such three slides. Eggs are recorded as degenerated when the contents are completely disorganized and no trace of miracidium can be made out.

It will be noted that the first obviously degenerated egg was met with on June 26—i.e., fourteen days after the commencement of the treatment and when a total of 5 gr. of the drug had been

given. On July 5 one healthy-looking egg was seen, but experiments were not made to see if it would hatch in water. Thereafter eggs were only seen on two occasions and were obviously dead.

Differential blood-counts were performed on four different occasions. It will be noted that there was a relative rise in the eosinophiles during the course of treatment.

TABLE V.—Blood Counts.

	Poly-morpho-nuclears	Large mono-nuclears	Lympho-cytes	Eosinophiles
June 11th ...	26 ...	20 ...	42 ...	12
" 19th ...	62 ...	10 ...	8 ...	20
July 4th ...	20 ...	6 ...	49 ...	25
" 24th ...	29 ...	5 ...	56 ...	10

The patient stood the injections very well. There was no cough, but at the end of an injection he often had a feeling of discomfort in the abdomen and a desire to go to stool, which quickly relieved the symptom. On one occasion a rigor followed one of the injections, and headache was complained of on two occasions. Phenacetin and caffeine quickly relieved this.

On July 25, 1919, his stools showed no ova, no blood, and only an occasional fleck of mucus.

Case 5.—October, 1915, went to Egypt. Excellent health till November, 1917. Then taken ill with blood in his urine. No fever. Had only bathed in a special military bath.

Present Illness.—Started with urticaria, pain in stomach and loins. Sent to base, where bilharzial eggs with terminal spines were found in urine. Sent to France after Egypt, then invalided home from there to England, July, 1918. Discharged from Army, October, 1918. Since that has gradually got worse.

Examination.—Systems all normal. Urine: terminal-spined eggs present. Faeces negative.

CASE 5.

Date 1919	Drug A.T.	Blood	Ova
July 5	...	Yes	Very numerous
" 8	1/2 gr.	"	30
" 10	...	"	11
" 11	1 gr.	"	85
" 12	...	"	35
" 14	...	"	30
" 15	1 1/2 gr.	"	13
" 16	...	"	14
" 17	...	Yes, less	28
" 18	2 gr.	"	44
" 21	...	Yes, much less	3
" 22	2 gr.	No	6
" 23	...	"	4
" 24	...	"	4
" 25	2 gr.	"	2
" 26	...	"	2
" 29	2 gr.	"	No
" 30	...	"	"
" 31	...	"	1 dead ovum
Aug. 2	2 gr.	"	No
" 5	2 gr.	"	"
" 6	...	"	"
" 7	...	"	"
" 8	2 gr.	"	"
" 9	...	"	"

Date 1919	Drug A.T.	Blood	Ova
Aug. 10 ...	— ...	No ...	No
" 12 ...	— ...	" ...	"
" 13 ...	2 gr. ...	" ...	"
" 14 ...	— ...	" ...	"
" 15 ...	— ...	" ...	"
" 16 ...	2 gr. ...	" ...	"
Total 21 gr.			

Note.—The examination of the ova in this case was conducted on a different principle as follows: 24 hours' urine was taken, sedimented, and a drop large enough to just fill the space under a 7/8 in. cover-glass was used for examination, three such preparations were made and the ova pooled and averaged.

COMMENTS ON THE CASES.

Question of Dosage.—In our series we have given 16 gr., 30 gr., 20½ gr., 21 gr., and 21 gr.; the largest dose of 30 gr. being required in Case 2, who after 16 gr. showed some blood again and a few ova on one day. An additional course of 14 gr. was therefore administered, which seems to have been sufficient to completely rid him of his infection.

There is no doubt that antimony given over prolonged periods of time, and in large doses, may produce signs of fatty infiltration in the liver and other organs,¹ and therefore the administration should be stopped whenever one concludes that the case is cured. The complement-fixation test devised by Fairley, if confirmed and proved to be sound, should allow one to determine when this has occurred, or in its absence the disappearance of blood and ova may be looked upon as conclusive. A total amount of somewhere between 20 and 30 gr. would seem to be sufficient to effect a cure, and this, compared with some of the doses given in other diseases, is not, in our opinion, excessive. Even though a certain amount of fatty change is produced in the liver, this can easily be recovered from, as evidenced in alcoholism, ankylostomiasis and other diseases. Bilharzial disease, it must be remembered, is a serious ailment, for which no treatment up to the present has proved in any way efficacious, and therefore it is quite justifiable to take the small risk involved in giving such injections. We have given much larger doses of antimonium tartaratum in other diseases, as the following list shows:—

Ulcerated granuloma (cured) ...	53½ gr. ⁵
" (uncured) ...	114½ gr. in three courses.*
American leishmaniasis ...	47 gr. ⁷
Kala-azar (Eastern) ...	64½ gr. (Fatty liver p.m.) ⁶

In addition to those, one of Dr. Daniel's cases of Rhodesian trypanosomiasis (the only one we know

who has survived his infection) has had over 500 gr. spread over 2½ years. This case at present is in quite good health, and the same may be said of the American leishmaniasis one. The kala-azar case did not die of the antimony, but of influenzal pneumonia.⁹ Large doses can therefore be given if due care is taken, and if each case is watched carefully throughout the course.

Points on the Administration of the Drug.—It is, we think, much the best plan to keep the patient in bed the day of the injection, and only to let him up next day if no untoward symptoms have taken place. All symptoms must be carefully recorded, and any indications of gastric or constitutional disturbance must be considered in detail, and if bad and recurring at each injection may contra-indicate further injections. The urine must be examined to exclude nephritis and faulty elimination from the kidneys. Albumin of itself does not contra-indicate the injections if this is part of the disease (vide Case 2), but the injections should then be given with the greatest caution.

Rigors are not uncommon after some of the injections, and cough immediately after is often troublesome. Sipping cold water may relieve this very quickly. We have not noted tachycardia, but one case complained of a constriction over the cardiac area after some of his injections.

The dose should be small to begin with (½ gr.), and then gradually worked up to see how the patient will stand it; 2½ gr. at a dose may be considered the maximum, any increase on that being dangerous. One of us, however (H. B. N.), has found that African natives stand antimony well, and in trypanosomiasis in East Africa has given up to 3½ gr. twice weekly with no bad effects.

The dilution of the drug is also important; we always give it dissolved in 2 oz. (60 c.c.) of normal sterile saline, and run it in through a fine needle as near as possible at blood heat. The solution is made up fresh a few hours before the time of administration, an important point; it must not be given old or after standing a long time. Too concentrated solutions, we believe, are dangerous.

At what Intervals should the Drug be Given?—We generally give the drug twice a week, and it should not be administered more frequently than this. Perhaps it would be better to give it only once a week, like salvarsan and its derivatives, but this can only be settled by careful analyses of the urine and faeces to determine how long the drug takes to be excreted. If it is all gone in three or four days, then there would appear to be no harm in giving it again after such a period of time.

Addendum.—Since this paper was written the first three cases described have been followed up and watched. No further signs of bilharzial trouble have manifested themselves, and as some months have now elapsed since the injections it is justifiable, we think, to say they are really cured.

⁵ Breinl and Priestley: *JOURNAL OF TROPICAL MEDICINE AND HYGIENE*, Feb. 15, 1918. Archibald and Innes: *JOURNAL OF TROPICAL MEDICINE AND HYGIENE*, April 1, 1919. Low: *British Medical Journal*, June 7, 1919.

⁶ Low and Newham: *British Medical Journal*, Sept. 16th, 1916.

⁷ Low and Newham: *Trans. Soc. of Trop. Med. and Hyg.*, April, 1917, vol. x., No. 6.

⁸ Low: *British Medical Journal*, April 19th, 1919.

⁹ *Ibid.*, June 7th, 1919.

* Loc cit.

Original Communication.

SOME NOTES ON CASES OF INTEREST FROM PRESTEA, GOLD COAST.

By WALTER E. MASTERS, M.D., M.R.C.S.

THE cases illustrated below were taken at random from my native clinic at Prestea, Gold Coast, during the past six months.

FIG. 1.—*Elephantiasis of the Scrotum.*

An early case to show the scarring so characteristic of the disease. Removed by amputation. Testicles preserved.

FIG. 2.—*Elephantiasis of the Scrotum.*

A more advanced case. The prepuce lies on the front of the tumour coiled like a sea shell.

Removed by amputation. Weight of tumour, 40 lb.

Several hydroceles were present in the mass.

In preparing the skin flaps for such cases one should remember and allow for a very considerable retraction of the skin upwards on the abdominal wall. The weight of a tumour (40 lb.) is considerable and unless the flaps have been cut sufficiently long a large area will remain for granulation or skin grafting which prolongs the period of convalescence considerably. In some cases there is not sufficient healthy skin, when the bare areas must be covered by skin grafts or left to granulate. It is as well to remember in any case that when the weight of the tumour has been removed the skin will retract several inches.



FIG. 2.

FIG. 3 (A and B).—*Elephantiasis of the Scrotum.*

A nodular variety contrasted with the previous one. The prepuce was as thick as the patient's upper thigh. The urine dribbled out of an orifice in which a pencil has been inserted. When this mass was slit open the penis when dissected out



FIG. 1.



FIG. 3.—A.

was found to be 10 in. long. Skin flaps were made for the proximal half and the mucous membrane forming the urinary orifice was carefully dissected out and inverted over the distal end of the penis, like the "finger" of a glove. It was

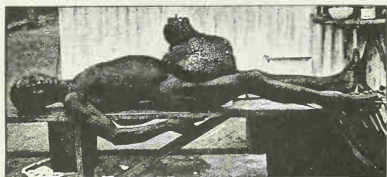


FIG. 3.—B.

then sutured to the skin flap covering the proximal half.

In amputating these tumours the operator is apt to lose his self-confidence in the early days owing to the difficulty in controlling the bleeding, but this can be avoided by following a simple plan not mentioned in text-books. The routine steps in all cases are of course to apply a figure-of-eight tourniquet round the waist of the patient and the neck of the tumour; then to cut the skin flaps below and above; then slit up the urinary orifice along a director to the glans penis; then to pass a gum-elastic catheter down the urethra as a guide in dissecting out the penis, being careful not to cut the urethra, a very easy thing to do; then to identify and dissect out the testicles and cords. There will be very little bleeding in carrying out these steps. This trouble arises when one begins to remove the tumour itself owing to the enlarged veins and arteries which lie in the next inch of tissue beneath the skin. I have found it best to penetrate this mass by blunt dissection near the right cord for example, and then to apply a pair of strong 3-in. forceps or clamps and cut away above this, repeating this around the tumour until it is all divided. If this is done there will be very little hæmorrhage, in fact the writer removed the tumour here illustrated without finding it necessary to ligature a single vessel during the cutting away of the mass. About six pairs of large strong clamps are required.

FIG. 4.—*Inguino-scrotal Hernia. Irreducible.*

Note the enlarged veins. This hernia was cured by radicle operation.

This case was of interest owing to its being what is known to us in the Tropics as a "land-slide," a condition not usually described in text-books. This particular sac contained viscera from the opposite side of the abdomen, namely, cæcum, appendix 6 in. long, ileum, ascending colon, omentum and several ounces of fluid. The appen-



FIG. 4.

dix was removed. The cæcum was very firmly fixed to the base of the sac for an area 2 to 3 in. in diameter and was uncovered by peritoneum

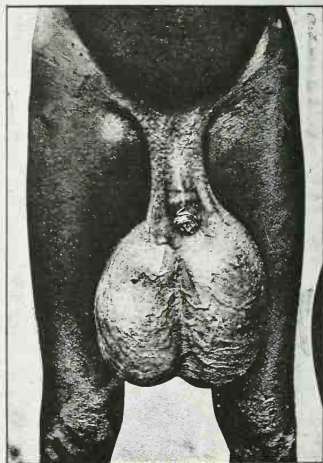


FIG. 5.

about that area, a characteristic and troublesome feature of these "landslide" cases. It is always very difficult to separate these adhesions without perforating the cæcum. Medical officers in the Tropics have often hesitated long about performing ordinary radical operations for hernia owing to the likelihood of meeting with these difficult cases. In some of my cases the cæcum has been so adherent to large areas of the sac that I have dissected the sac from the scrotum, slit up the ring and returned the lot wholesale to the abdomen. In cases where the cæcum can be dissected from the sac and returned, the part being uncovered by peritoneum probably becomes fixed to the right iliac fossa by adhesions and gives no more trouble and by its fixation in its new bed prevents its relapse.

FIG. 5.—Double Idiopathic Vaginal Hydrocele.

Ten years duration. Double radical operation performed.

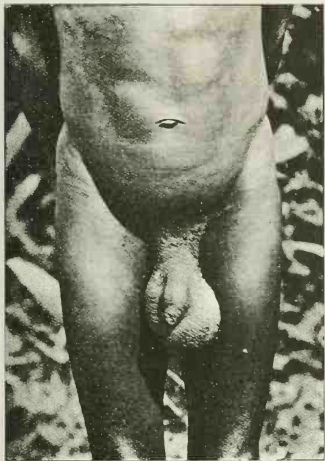


FIG. 6.

FIG. 6.

Same case as above three weeks after operation. Note the healthy condition of the skin after hospital care. The swellings in both groins have disappeared now that the weighty tumours are removed. The patients usually suspend these tumours from the waist in a cloth. They cannot of course wear trousers.



FIG. 7.

FIG. 7.—Double Hydroceles.
Cured by radical operations.



FIG. 8.

FIG. 8.—*Left Hydrocele and Phimosis.*

Of twenty years duration. In this case castration and circumcision were done. Often the vessels of the cord are so spread out fan-wise around the wall of the sac and the latter is so thickened that the bulk of the tumour is only reduced by one half unless castration is carried out. In some of my cases I have found the sac to be half an inch thick and the contents to consist of thick, stringy, chocolate-coloured masses with a degenerated testicle that one could do nothing with but castrate.



FIG. 9.

FIG. 9.—*A Case showing: Double Hydroceles, Double Inguino-scrotal Hernia, Umbilical Hernia.*

Radical operations were done for the four former but the latter being 'a thing of beauty and a joy for ever' was not touched. As is well known the native women attendants at birth produce these umbilical herniæ by pulling on the cord. Such protrusions are much admired and sought after. I have had several cases of nipped-gut in these herniæ but no operative interference was allowed owing to the possibility of removing this protrusion.

FIG. 10.—*Lipoma of Neck.*

These tumours are fairly common, easy to remove and quickly add to the renown of the surgeon.



FIG. 10.



FIG. 11.

FIG. 11.—*Two Cases of Anasarca for Comparison.*

The case to the left was post-influenzal and was brought to me in extremis owing to the pressure on the heart and lungs. He was tapped twice; 210 and 120 oz. being removed. It did not recur and the patient went to work again.

The case on the left was in much the same condition on admittance to the hospital but the cause in his case was alcoholic cirrhosis of the liver. He was a native gin drinker. He was tapped twice, 190 and 180 oz. being withdrawn. He died and a typical hobnailed liver was found.

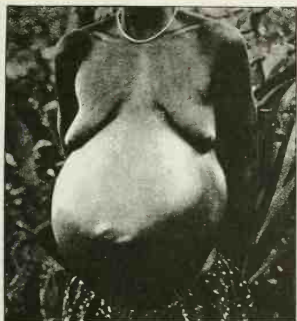


FIG. 12.

FIG. 12.—*Ascites.*

The cause was malignant disease of the kidney. This woman was admitted in extremis and looked very like bursting at the umbilicus. After 380 oz. of viscid blackish-red fluid had been drawn off an irregular nodular mass was felt, kidney-shaped, in the position of the right kidney.

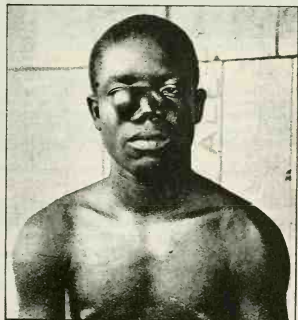


FIG. 13.

FIG. 13.—*Double Goundou.*

The sight of the right eye was almost completely occluded owing to the bony growth. They were

removed with chisels and gouges quite easily. The trouble in such cases is with the native anaesthetist. Care has to be taken not to fracture the inferior orbital plate which is very thin, nor to penetrate the nasal passage although these latter cases seem to heal up well owing to good nasal drainage.



FIG. 14.

FIG. 14.—*Goitre.*

Adenomata of the thyroid and diffuse enlargements of the gland itself are fairly common. The latter are more difficult to remove owing to the hæmorrhage.

FIG. 15.—*Uterine Fibroid, 12½ lb.*

This woman had suffered for seven years. A laparotomy was done by me and the incision enlarged from the pubis to the ensiform cartilage to enable me to remove the tumour. She also had a cyst of the right ovary the size of a large orange, a small cyst of the left ovary and left chronic salpingitis. The left Fallopian tube and ovary were removed and can be seen on the left side of the tumour which has been incised. This snap-shot was taken two weeks after the operation. It is extremely difficult to keep native patients in bed long enough.

FIG. 16.—*A Malarial Spleen in a Child.*

This child was brought to me in a moribund condition. As a result of quinine treatment the spleen was reduced in a few weeks to the size of a double fist. The mortality amongst infants and children due to malaria is very high. Lay people



FIG. 15.



FIG. 16.

visiting the Tropics and seeing the many children about will not believe this. From native mothers attending my clinic the following data has been obtained:—

Total pregnancies in 120 women	573	or 4.8 each
" abortions	82	14.3 % of pregnancies
" born alive	491	85.6 " "
" died	265	54.2 % of live births
" living	224	39.1 % of pregnancies
		45.6 " live births



FIG. 17.

FIG. 17.—*Malignant Disease of the Jaw.*

This was a case from the Belgian Congo where the writer was doing research work on Human Trypanosomiasis during three and a half years.

♦

The Toxicity of Hydrochloride of Emetine in Man (F. Van den Branden, *Bull. de la Soc. de Path. Exotique*, October 8, 1919).—In treating negroes for amebic dysentery it was found that an intravenous dose of 0.10 gm. of emetine hydrochloride was easily tolerated by an adult of medium weight. Subcutaneously and intramuscularly 1 gm. was tolerated in two cases, but both showed toxic symptoms, so that a limit of 0.25 or 0.50 gm. would seem to be indicated. Moreover, to avoid unfavourable cumulative effects a total quantity of 1.40 gm. of the drug should not be exceeded in any one month.

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an observer and in the ways of research, but nothing except a few lectures on the more special forms of surgical troubles is even mentioned. This training is no doubt excellent from a scientific standpoint, and one calculated to advance our knowledge, but from the practical and, especially the surgical, point of view, it is in its way detrimental to his own prospects and to the welfare of the community of which he is placed in charge.

The requirements of a young surgeon are a thorough and intimate knowledge of anatomy and a skill in operative surgery which can only be acquired in the operating theatre. But how is this to be obtained? Anatomy soon fades from our memories, unless it is persisted in for some time beyond the two years' study requisite to fulfil the requirements of the Examining Boards; for even the clinical anatomy classes held during succeeding years of study are but poor substitutes for the dissecting room teaching of earlier years. But if anatomical knowledge fades, how about operative surgery, which, beyond a few demonstrations on the dead body, has never been taught at all? It is the desire of most students to become a House Surgeon in the hospital attached to his medical school, but students are many and appointments are few, and not one-tenth part of the students of any year have the opportunity of serving as a House Surgeon. But even were he fortunate enough to obtain this appointment, what does it amount to? A knowledge of clinical surgery it may afford, but as a training in the actual performance of anything beyond minor surgery it seldom is.

The early years at which a medical man goes to the Tropics is against his acquiring practice in operative surgery sufficient to give him that reliance upon himself, which is the be-all and end-all of the operator's equipment; especially when he has to depend solely upon himself, as he must do when he is away from a large town in the Tropics. Many a man in tropical practice lives in daily dread of a surgical case turning up in which an immediate operation of a serious nature is called for. Even a strangulated hernia is dreaded, as he has never done one, and may seldom have been more closely acquainted with the operation than in a distant view of the procedure from the back row of the operating theatre whilst a student. All this may be acknowledged as quite true, but what is the remedy?

How can a young doctor become fully acquainted with major operations? As a House Surgeon in a hospital with a medical school attached he gains, no doubt, an actual knowledge of operative surgery. He may have seen many such performed by masters in the art, but he is only a looker-on, not the operator—a mighty difference. The surgeon who has the interests of the young medical man at heart will himself become the assistant and allow his House Surgeon to actually do the operation; but both in hospital and private practice there is much against this. The authorities on the one hand, and the friends on the other, may object to such a step. The writer has had much to do with House Sur-

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DECEMBER 15, 1919.

THE YOUNG SURGEON IN THE TROPICS.

Nothing pays a medical man better in the Tropics than skill as an operator. There can be no doubt that to the young man about to proceed to the Tropics to practise his profession too little attention is paid to his surgical training. In our tropical schools everything is done to equip him as

geons at the Seamen's Hospital attached to the London School of Tropical Medicine. After watching the aptitude of a newly appointed House Surgeon, in a few weeks he (the writer) gradually encourages him to do minor operations on the operating table, and gradually to perform more serious operations, such as strangulated hernia, radical cure of hernia and amputations, search for pus in the liver, and drain the abscess cavity by the trocar and cannula method, trephine the skull, &c., whilst the writer stands by and acts as assistant. In several instances he has discovered that his House Surgeon possesses the surgical instinct, and more than one of the House Surgeons thus trained have gone abroad with an assurance that they will not only not be afraid of whatever may turn up, but that they are competent to meet any emergency that may arise in their practice.

In our Tropical Medical School hospitals our House Surgeons should be recruited only from men intending to go abroad. Few, however, find time, for this; they go for a three months' arduous course at the school, where they cannot find time even to see surgical operations, far less to take part in any way at the operating table. Some men will not even come to see a liver abscess being done, nor an elephantiasis of the scrotum removed, so engrossed are they in their laboratory work and in preparing for the diploma examination, when it is near at hand. Surgery and surgical operations are at a discount, for not being part of the approaching examination are without interest; and yet when the student lands at his destination in the Tropics, one of these major operations may be one of the earliest duties he has to perform. One pities the man for his anxieties as the date for operation approaches, and for the sleepless night he passes in anticipation of the following morning's duties if he has not been versed in the proceedings; versed in the sense that he has done or even seen an operation of the kind previously.

The removal of this ignorance and anxiety is only to be accomplished in one way, viz., that it be part of the compulsory training that tropical students should require certificates of attendance at classes of practical surgery before being granted a diploma in tropical medicine. The word "medicine" should, as it rightly indicates, include both medicine and surgery, for surgery is the handmaid of medicine and an integral part of the science and art of medical practice.

The young doctor on reaching his destination and starting practice in the Tropics will find many surprises in his daily work. The writer remembers well his own experiences during the first two months of practice in the Tropics. (a) On drawing off fluid from a hydrocele, instead of the clear fluid he anticipated to find, there came through the cannula a milky-looking fluid which, after standing in a tall glass, separated into three portions, a mass of flakey material at the bottom, a cloudy fluid in the middle, and a pink-stained layer on top. All departures from the normal clear fluid met with at home were put down as cholesterol, but the superficial fluid

now seen was not opalescent, and below the microscope movable bodies were seen, which subsequent experience proved to be filarial embryos of which he had never even heard. (b) Opening a "cold" abscess on the back of a man's forearm the writer found pus, but in addition a fine thread-like body clung to the knife, the presence of which puzzled him much, and it was only when shown to Sir Patrick Manson that he learnt it was a male parent filaria worm that he had found. (c) The writer was called to see a male Portuguese who had a distended bladder and could not pass urine. A silver catheter failed to relieve him after being twice passed, owing to the eye of the instrument being blocked by a white curdy-looking matter. Cystotomy (a Cock's operation) was prepared for, but before doing so a prostatic catheter was introduced, and pushed right home until the end could be readily felt through the abdominal wall above the pubis. Presently a broken curdy material passed in jets through the catheter until well-nigh one and a half pints of the curdy material were drawn off and the patient was relieved. Sir Patrick again came to the writer's relief, and explained that it was the chyluria of a patient with filariasis. (d) A patient with high fever, severe loin pains, and with large swellings suddenly developed in one groin of a kind unfamiliar to the writer was met with, and he was made aware of the fact that he was dealing with an attack of filarial fever with peri-adenitis due to blocked lymphatics in a man suffering from filariasis. Many other surgical ailments of a kind hitherto unknown to the writer were met with in these first two months of tropical practice. These were surgical surprises—for there were no textbooks to refer to in the 'eighties of last century—and it was only by experience, bitter experience in many instances, that the writer became cognizant of the fact that new phases of surgery were part and parcel of medical practice in the Tropics. Again, in major operations it was brought home to one that most surgical cases were of a desperate character before relief was applied for. Natives of the Tropics, as a rule, are dealt with by native practitioners before coming to the European doctor, and if the surgeon is to gain reputation and therefore practice, he must be ready to operate on such desperate cases so as to gain the confidence of the natives in his neighbourhood. The surgeon, therefore, should be well versed in surgical operations before going to the Tropics, extra well versed in fact, for not only has he to do with "oddities" in surgical cases, but also with advanced cases of surgical ailments which require the utmost skill and courage to tackle.

J. CANTLIE.

Malaria at Algiers—Difficulty of Diagnosis when resembling Typhoid (J. Crespin and G. Athias, *Bull. de la Soc. de Path. Exotique*, October 8, 1919).—Two cases described at length to show the readiness with which the more obscure forms of malaria may be mistaken for typhoid in a district where the former is unknown except in immigrants.

Annotations.

Pseudo-malignant Disease of the Stomach (G. Lion, *Archives des Maladies de l'App. Digestif*, March, 1919).—Tumours found in the stomach at operation are so extensive that their removal seems out of the question, and yet these patients with supposedly inoperable cancer keep on living and finally seem to throw off the disease. A striking case of the kind in a man of 30 who had been having stomach disturbances for ten months with finally signs of stenosis of the pylorus; operation showed a tumour at the pylorus extending to the lesser curvature and surrounded by hypertrophied glands so numerous and some at such a distance that any operation seemed hopeless, although the tumour was movable its entire extent. The tumour was left unmolesated after gastro-enterostomy, and the man rapidly regained his health. He had refused the proposed treatment as for syphilis, and he lived in good health for twelve years when he succumbed to intercurrent disease. The stomach was found small, but with no tumour nor scars nor pronounced thickening of the walls. The pylorus was retracted, but the gastro-enterostomy opening was perfect, and the glands were of normal size. In a second case a man of 57 with an actual, inoperable gastric cancer survived for four years and seven months after the palliative gastro-enterostomy. Re-examination of seventy-six other cases of palliative gastro-enterostomy for inoperable gastric cancer showed that one patient survived for fourteen years; four for nine; two for eight; three for seven; six for six; nine for five; thirteen for four; and thirty-eight for three years. In five of these cases the malignant nature of the tumour was established beyond question, and these survived from three to five years. In one other case of actual cancer, the patient survived the gastro-enterostomy for two years and four months. Various affections may be mistaken for cancer, especially ulcer, syphilis and tuberculosis. Even with the stomach open before him, the surgeon may be unable to tell certain inflammatory from malignant lesions. In case of doubt, histologic examination of a gland is advisable. Lion's experience with 200 cases of unmistakable cancer, on the other hand, demonstrates the great corroborative value of the chemical stomach findings. Syphilis simulates gastric cancer most often; the benefit from treatment is the touchstone. But in one case described there was associated gastric cancer and syphilis, and the umbilicus also ulcerated. Under specific treatment this healed and the tumour in the stomach disappeared, the patient regained strength, but later the cancer produced symptoms.

American Trypanosomiasis or Chagas' Disease in Venezuela (Enrique Tejera, *Bull. de la Soc. de Path. Exotique*, October 8, 1919).—Cases are cited to prove that the disease exists in Venezuela. It

would seem to be transmitted by the *Rhodnius prolixus* Stal, an insect from which the author was successful in recovering a trypanosome resembling the *Trypanosoma cruzi* in all its morphological characteristics. The *Conorhinus megistus*, which transmits the infection in Brazil, is unknown in Venezuela.

The Action of a Combination of Atoxyl, Tartar Emetic and Trypanosan on the Trypanosoma Congolense (F. Van den Branden, *Bull. de la Soc. de Path. Exotique*, October 8, 1919).—Atoxyl and tartar emetic, administered separately and in combination, though exerting a favourable action on the general condition of cattle and sheep infected with *Trypanosoma congolense*, seemed powerless to destroy the organism. The addition of trypanosan in doses of 0.26 gr. per kilogram of the animal's weight, however, freed the blood of trypanosoma, as confirmed by tests made three months after cure.

A Preliminary Note of the Insect transmitting Leptomonas davidi (C. França, *Bull. de la Soc. de Path. Exotique*, October 8, 1919).—From a district where the average number of parasite-harboursing *Euphorbia segetalis* is high the writer has succeeded in obtaining specimens of *Stenocephalus agilis* infected with *Leptomonas davidi*. The most remarkable feature of the infection was the presence of little cysts with thick capsules in the proboscis, and enormous masses of tiny non-flagellate forms in the salivary glands.

Abstracts.

ENTERIC FEVER AND PROPHYLACTIC INOCULATION IN BRITISH GUIANA.

By F. G. ROSE.

IN Georgetown, the capital, enteric is endemic with periodic effervescences, and among the 50,000 odd inhabitants of the town there were, in 1914, 154; in 1915, 196; in 1916, 190; in 1917, 272; and in 1918, up to October 31, 206 notifications of enteric fever.

The ultimate source of all infection is the infected person, divided into three classes:

(1) Sufferers from enteric, *a*, Recognized; *b*, Unrecognized.

(2) Persons who have suffered from enteric: Temporary carriers.

(3) Persons who have had an attack of enteric fever more than six months previously, and are still excreting the bacillus in their faeces, or urine, or in both: Chronic carriers.

Now carriers in civil life are not the danger to the community that infected persons are in the army.

¹ Abstracted from *Transactions of the Society of Tropical Medicine and Hygiene*, xiii, No. 2, September 19.

But the conditions under which the civil community live are subject to the widest variations. In Georgetown the vast majority of the cases of enteric are drawn from the poorer classes, the blacks and East Indians, who live under conditions very nearly akin to barrack life in its most insalubrious form, and carriers in Georgetown are as dangerous as army carriers.

What are the conditions of life among the poorer classes in this city? The great majority of its inhabitants belong to the lower classes, and therefore in common with these classes in every other part of the world, of a very low standard of cleanliness. Most of them live in dwellings known as ranges, that is to say, wooden houses of one flat, consisting of a long row of single rooms, each of which is often divided by a screen, locally known as a "part-off," into two parts, one serving as a living and the other as a sleeping-room. Each range may consist of a number of rooms varying from two rooms to nine or ten, and each room almost invariably houses more than one person, often a family of six or more.

A yard may contain several of these ranges, and perhaps some small two-roomed cottages, housing over thirty inhabitants, and provided with two closets, each with one or two compartments, draining into a single cesspit, and ministering to the wants of the whole of the thirty inhabitants.

Moreover, these dwellings are not confined to one or two quarters, but are indiscriminately distributed throughout the town; some excellent specimens are to be found in the near neighbourhood of Government House.

To add to the dangers inherent in these conditions, these classes are notoriously backward, by reason either of pecuniary difficulties or of pressure of time, in seeking medical advice. Thus, of fifty-five cases admitted to the Public Hospital, Georgetown, in 1915 and 1916, in which the duration of the disease was plainly established either in post-mortem lesions or such signs as intestinal hemorrhage, it was found that no fewer than eighteen, or 33 per cent., did not even take to their beds until early in the second week of the attack. It has to be remembered, too, that the rose-spots are not available for diagnosis among the dark-skinned races, so that even if medical advice is sought, it may be some days before the diagnosis is established, especially as the Widal reaction is not available before the end of the first week of the disease.

When one realizes that there were notified in Georgetown in one year over 150 cases, so large a proportion of which were, during at least one week of the infective stage of their illness, going about their ordinary duties undiagnosed, there will be no difficulty in understanding how potent a factor this class probably is in the spread of enteric.

Cases of familial infection abound.

Class 2, the temporary carrier is, again, a fertile source of infection.

From the stools of thirty-three enteric convalescents just before their discharge from the isolation ward, *Bacillus typhosus* was isolated ten times, and *B. paratyphosus* once.

As to Class 3, the chronic carriers, it goes without saying that, in a town such as this, where enteric is always with us, the chronic carrier must abound.

The writer investigated two small localized epidemics, in which all the evidence pointed to one of this class, though the bacillus was never recovered from the excreta of the suspect before his disappearance; the serum, in both cases, agglutinated *B. typhosus* in a dilution of 1 in 100 in less than half an hour.

One confessed to having enteric four years previously; the other strenuously denied ever having had it; both objected to examination of the excreta and incontinently vanished after one examination. These investigations showed that Class 2 and Class 1b, and to a less extent, Class 3, probably acted as reservoirs for the enteric organizations in the town.

Inquiry was then directed towards ascertaining the ordinary channels of infection through which the bacillus passed to the prospective patient under local conditions.

This disease, as we have said, is endemic, but at certain periods each year the number of cases shows a decided and alarming increase.

From year to year, since 1912, when notification was first enforced, there has been but slight variation. The largest number of cases was in 1913, when there were 254; this was also the driest year of the series, but in 1914 the number of cases was the smallest of the series, although there were 12 inches less of rain than in 1916 and 8 less than in 1915.

It cannot, therefore, be said that the number of cases in a year has any relation to the dryness of that year.

Further, with regard to the temperature, the relationship between rainfall, average maximum and average minimum temperatures on the one hand, and the number of cases of enteric admitted to the Public Hospital, Georgetown, no relationship can be traced.

With regard to drinking-water supply in Georgetown, it is almost entirely derived from rain-water, which is stored in wooden vats and cisterns; if therefore, drinking-water played any large part in the spread of enteric, this would be reflected in the corresponding curves. Further, one would expect to find epidemics showing the special features displayed by the disease when derived from such a source; for example, practically simultaneous occurrence of a group of cases in a yard where all the inhabitants drew their supply from the same vat. Such features are absent from the local epidemics.

Moreover, at a time when enteric was at its height in the town, repeated bacteriological exam-

infectious of vat-water from yards containing infected persons failed to reveal any suspicion of exceptional faecal contamination, nor were enteric organisms ever isolated, though this was hardly a matter for surprise.

The milk-supply has been found to be implicated in one or two isolated cases by Wise [1], but here, again, one can point to few cases in which such an origin seems at all probable.

In fact, it may be said with certainty that there is no particle of evidence that the prevalence of the disease in this country is associated in any appreciable degree with such agencies as the drinking-water supply, or such foods as milk, shrimps, or shell-fish of any description.

Flies must play but a small part, for, whatever may be the difficulties with which sanitarians have to cope in Georgetown, it cannot be said with any truth that the house-fly is one of any magnitude; in fact, considering the sanitary conditions, we are a remarkably fly-free town.

With regard to the contamination of the soil, however, there is some evidence, it has been considered, of a connection between this and the spread of the disease.

Minett [2] in a review of the causes of enteric observes that all large towns must abolish the privy and open cesspit system at whatever cost; otherwise to expect a reduction in the typhoid rate is hopeless. Others have said or implied that the installation of a water-carriage system of sewage disposal will at once bring about a reduction in the enteric rate.

Now, these statements must mean either that such a change will lessen the influence of the carrier as carrier, or else that, in the opinion of the writers, there is some inherent defect in the cesspit system which has the effect of rendering it a powerful intermediary in spreading infection.

Since the former can only be the consequence of a change in his habits, the latter is the only alternative we need consider, and this supposed defect is obviously bound up with the question of the vitality of the typhoid and paratyphoid organisms in the soil, in sewage and in air.

Taking, first of all, the soil, it is dangerous for some hours, but is no longer so when dry enough to be blown about as dust.

As to sewage, it is generally recognized that the survival of the bacillus in sewage is dependent on the multiplication, or otherwise, of *B. coli* and other organisms. There is, however, another organism in this colony which, it would appear, deserves to be taken into account in this connection; I refer to *B. pyocyaneus*.

The writer had been struck by the frequency with which this organism is to be isolated from water-supplies, feces, pathological conditions such as abscesses, osteomyelitis, &c., in Georgetown. Minett and Duncan [3] have published a paper dealing with its pathogenicity in this colony. A series of experiments was performed by him in 1915 with regard to antagonism between this organism and

the typhoid and paratyphoid bacilli. The results may be briefly set down here. There was found to be no antagonism between *B. typhosus* or *paratyphosus* A or B and *pyocyaneus*, such as was found between pneumococcus and meningococcus, nor was inhibitory action anything but slight between *B. coli* and the organisms of the enteric group. The truth appeared to be that both *B. pyocyaneus* and *B. coli* at room temperature grow far more rapidly and profusely than these organisms, and rapidly overgrew them, generally in two or three days.

As to the vitality of these organisms in water, uncultivated typhoid bacilli died in Thames water generally in the first week, but rarely as late as the second and third.

It will be seen, therefore, that it is impossible to eliminate soil-contamination as a factor in the spread of infection, but we may say that the danger in Georgetown is mitigated by the fact that the atmospheric conditions are practically always favourable to the multiplication of *B. coli*, *B. pyocyaneus*, and other organisms in sewage antagonistic to the enteric group of organisms, unless we assume the possibility of transmutation of *B. coli* under certain conditions into organisms of that group.

In July, 1917, inoculations began to be made free of cost to those who wished.

Two inoculations are given to each person, the interval being ten days, and the adult dosage 1,000 millions of bacilli at the first inoculation, and 2,000 millions at the second, each dose being made up of *B. typhosus* and *B. paratyphosus* A and B one part each.

Other measures included, as regards the city of Georgetown, the strict isolation of enteric cases and the testing of faeces and urine on three separate occasions by this department for organisms of the enteric group before discharge.

There are in the colony three well-marked centres of infection: The city of Georgetown in particular; a group of sugar estates on the East Bank of the Demerara River; and a group of sugar estates and villages on the coast-line. These three centres were responsible jointly for 299 of the 364 cases notified from all parts of the colony in 1916, Georgetown heading the list with 190, the East Coast coming next with 58, and the East Bank furnishing 51 cases.

From the latter months of 1915, inoculation was energetically undertaken by the Government Medical Officer of the district on several of the East Coast estates; latterly this has been extended to most of these estates, and inoculation has also been extensively resorted to by the Acting Government Medical Officer of Health among the villages on this coast. While in 1917 the East Coast furnished 119 out of a total of 698 cases, from January to December, 1918, this group furnished but twenty-eight. Other districts showing reduction have been the West Bank of the Demerara River, from twenty-six cases in 1917 to five cases in 1918 (to October 31), the West Coast district from fifty-

seven to thirty-two up to October 31, 1918, and certain areas in Berbice County.

On the contrary, Georgetown has been responsible for no less than 206, and the East Bank group 160 cases to the same date.

These groups and the Suddie, Essequibo, district are the only ones to show an increase or a slight decrease.

The following table shows the approximate population of ten centres in the colony, the total number of people inoculated in 1917 and 1918, the

and it will, therefore, be apparent that other measures, such as a vigorous sanitary propaganda and the instalment of an efficient system of sewage disposal, are at least as necessary as inoculation.

REFERENCES.

- [1]—R. S. WISE, "Studies in Enteric Fever." *British Guiana Medical Annual* for 1910.
- [2]—E. P. MINETT, "Review of Causes of Enteric Fever." *British Guiana Medical Annual* for 1912.
- [3]—MINETT and DUNCAN. *JOURNAL OF TROPICAL MEDICINE AND HYGIENE*, June 1, 1911.

District	Population	Total numbe inoculated	Percentage of persons inoculated	Notifications of enteric		
				1916	1917	1918 (to Oct. 31)
1. Georgetown	54,000	1,431	2.6	190	272	206
2. Buxton (East Coast) ...	26,000	3,107	12.0	34	67	8
3. Plaisance (East Coast) ...	23,000	2,396	10.4	24	52	20
4. West Coast	30,000	1,300	4	18	57	32
5. West Bank	13,000	1,227	9.4	8	26	5
6. Berbice County	60,000	824	1.4	24	72	32
7. New Amsterdam	8,000	225	2.8	2	16	8
8. Essequibo	22,000	770	3.5	7	19	41
9. Wakenaam Island	5,000	170	3.4	4	7	1
10. East Bank	17,000	4,038	23.8	51	110	160

percentage of the population inoculated, and the number of notified enteric cases, in the latter case from 1916 to 1918. The inoculations were carried out chiefly in 1917 and 1918, though in the case of the East Coast and the East Bank districts, some were also done in 1916.

It will be seen that those centres in which a number in the neighbourhood of 10 per cent. of the population has been protected show a distinct decrease in the number of notifications, with a single exception of the group of estates and villages. Several different explanations of this are possible.

For example, it has been necessary to group together both estates and villages, whereas nearly all, or, at any rate, the vast majority of the inoculations were done on certain estates.

Secondly, the figure given for the number of inoculations has been based on the number of vaccines sent out from the laboratory, but, whereas unused vaccines are returned from some districts, it was discovered that those unused had been kept on the estate in some cases.

With regard to the efficacy of the vaccine, records have unfortunately not been kept with regard to cases and deaths occurring in the inoculated, except in cases inoculated by me, but opinion is unanimous that the rate of incidence and mortality among the inoculated is considerably lower than among the unprotected.

The conclusion is that inoculation on a voluntary basis—and compulsion appears to me undesirable, and perhaps, impossible—is not to be depended on as a method of preventing the spread of enteric in civilian communities in the tropics, unless a number in the neighbourhood of 10 per cent. of the population submits to inoculation.

It would be hardly possible without very energetic efforts on the part of the Public Health staff to get a much larger proportion to submit voluntarily to inoculation except during an epidemic,

BLINDNESS IN INDIA.¹

In the village homes of India lie great masses of helpless humanity, submerged in dark pools of blindness. The pity of it all lies in the fact that so much could be done to rescue these poor people, if their true condition were once realized by their more fortunate fellows. Much of the blindness of India is curable, and even more is preventable. To me it seems that the duty and the privilege of undertaking this work lies with the State, and that no sum spent on such a task could be too large. Unfortunately this is not the view that has been taken by those in authority, and consequently we see the spectacle of private enterprise endeavouring to undertake this colossal task. One looks on with mixed feelings, many of which must be left unexpressed, but it is at least permissible to voice an admiration of the stand Mr. Henderson has taken. His writings on so technical a subject are moderate, well-balanced and erudite. He never overstates his case. The remedies he proposes recommend themselves at every step, and one's only criticism of them would be that they do not go far enough; simply because the means for going as far as he would wish are not yet in his hand. The best one can hope for his endeavour is that he will succeed in arousing the conscience of educated Indians to the needs of their less fortunate countrymen, which shall ensure this great problem being faced in a way that it deserves. If Mr. Henderson and his band of workers can rouse the Government of India and the educated Indians to do their whole duty by the blind in their midst, he will have succeeded where heretofore even a well-organized medical profession has failed.

¹ Abstract from Foreword by Lient.-Colonel R. H. Elliot, M.D., F.R.C.S., I.M.S., on Mr. C. G. Henderson's pamphlet.

Colonial Medical Reports.—No. 88.—St. Lucia (continued).**REPORT OF THE MEDICAL OFFICER OF THE THIRD DISTRICT.****CASTRIES.**

At the Castries Dispensary 4,233 patients were treated, and at Anse-la-Raye 863. These numbers do not include repeats.

Intestinal parasites and malaria greatly preponderated; and diseases of the alimentary and respiratory systems, especially among children under 5 years of age, and venereal diseases came next in order.

This digestive disorder among children of a tender age is no doubt largely the result of improper feeding.

Quite a number of yaws cases weekly sought admission to the Yaws Hospital for treatment, but frequently many or all of them had to be returned in consequence of want of accommodation at that institution; this is to be regretted, as the greater the number which can be treated at the same time the greater will be the chances of stamping out this disease which so strongly tends to hamper the labour power of this country.

Towards the end of 1916 and the beginning of 1917 there was the usual prevalence of influenza, colds, and bronchitis which occurs at this season, but the mortality on this score was very small. 235 successful vaccinations were performed at the Castries Dispensary and forty at Anse-la-Raye.

C. B. DEAR, M.D., C.M.,

Medical Officer, District III.

REPORT OF THE MEDICAL OFFICER OF THE FOURTH DISTRICT.**SOUFRIERE.****INSTITUTIONS.**

(a) *Casualty Hospital.*—There were no patients in hospital at the end of March, 1916. Thirteen were admitted during the year, of whom two died, one from extensive burns and the other from severe spinal injuries.

There were no patients in hospital at the end of March, 1917.

(b) *Pauper Asylum.*—There were seventy inmates in the asylum at the end of March, 1916, and thirty-five cases were admitted during the year, making a total of 105 cases. There were twenty-one deaths, and at the end of the year seventy inmates remained in the institution. The question of increasing the accommodation is an urgent one, as the institution invariably has more than its full complement of inmates. There are deserving cases awaiting admission, and I am compelled to turn a deaf ear to requests and entreaties as there is no accommodation available. The strenuous conditions brought about by the War seemed to have thrown a good many over the brink who could just pull through in pre-war days.

(c) *Yaws Hospital.*—Very heavy seas experienced

early in October, 1916, caused considerable damage to the two yaws buildings situated on the beach at Malgretoute, and in consequence it was decided to remove all the buildings comprising the Yaws Hospital from the foreshore to higher land behind, which necessitated closing the institution for the admission of yaws cases from then till February 3 when admissions were again restarted. There is, in consequence of this temporary closure, a diminution in the number of cases admitted and treated as compared with former years.

The buildings now occupy a very agreeable site, which is in all respects preferable to the former situation, but some little time must elapse before everything is settled and adjusted.

The male leper hut has also been extended, and provides accommodation for ten lepers, of whom eight are now housed there. There are two inmates in the female leper hut, which provides accommodation for four cases.

Thirteen cases of yaws and six of leprosy remained in the institution at the end of March, 1916. 278 cases of yaws and seven of leprosy were admitted, making a total of 291 and 13 respectively.

One death took place from advanced tubercular leprosy.

At the end of March, 1917, there were ten lepers and five yaws cases in the institution. Up to the end of the year 1,462 cases have been treated with "salvarsan," "arseno-benzol," or "kharsivan," exclusive of reinfections. Of these eighty-three cases have been readmitted, nearly all of which are classified as cases of reinfection, as a considerable time has elapsed between discharge and readmission.

Two hundred and seventy-four cases were treated during the year. At present only very urgent cases are to be admitted to the Yaws Hospital, where provision is only made for a maximum of fifteen patients.

Dispensaries.—1,324, 870, and 714 patients presented themselves for treatment at the Soufrière, Choiseul, and Canaries Dispensaries respectively, as against 1,232, 687, and 686 last year. These numbers do not include repeats. As will be seen from the numbers returned, yaws cases are still coming forward voluntarily for treatment with "kharsivan," and I fear that the condition is still prevalent.

In January and February, 1917, there was a sharp outbreak of influenza throughout the district, which was fortunately rarely attended with any grave complications and is now practically at an end.

The cases of typhoid returned were those who attended at the dispensary where the condition was recognized, but most of the cases were visited and diagnosed at their own homes.

One hundred and two successful vaccinations were performed at Soufrière, forty-five at Canaries, and 122 at Choiseul.

General.—There were all told 140 cases of enteric

fever at Canaries, of whom 111 were treated in hospital and twenty-nine outside. Of these seven died in hospital and six outside.

A few sporadic cases of enteric fever were met with at Soufrière, and there was a very slight outbreak in the vicinity of Saltibus, which was limited to a few houses and soon died out. Disinfection of the premises, &c., with a solution of cyllin was regularly carried out.

A. F. HUGHES, M.B., Ch.B.,
Medical Officer, IV. District.

REPORT OF THE MEDICAL OFFICER OF THE SIXTH DISTRICT.

DENNERY.

The sanitary condition of the district as a whole was fairly good; the majority of cases applying for treatment as usual being sufferers from worms (*ascaridæ*), digestive disorders, and malarial fever. The last was chiefly of the benign type and readily amenable to quinine administration; but a few cases of the gastric malignant type were met with, and were quickly controlled by calomel (gr. 4) on the tongue and the hypodermic injection of quinine bihydrochloride (gr. 10).

There are many cases of yaws in the Mabouya Valley; but owing to the limit of admissions at the Yaws Hospital the majority had to be treated at their homes while paying weekly visits to the dispensary at Ressource.

Gonorrhœa and syphilis have been rather prevalent in the district, and have been introduced from Castries by visitors thereto and sailors therefrom. Unfortunately the victims at the declaration of the diseases indulge in various "cooling draughts," disseminate the virus wholesale, and do not seek recognized rational treatment unless complications arise or the chronic stage is reached after prolonged treatment by "experienced friends." As regards syphilis, it is rare to see the primary chancre—the hard Hunterian—in its early stage; it is chiefly met with when extensive ulceration has resulted from pyogenic infection or in association with a soft chancre. I have not yet seen in this district an extra genital chancre, but I have had to treat a syphilitic glossitis.

The water supply in Dennery is not uniformly appreciated, the fastidious and hypercritical declaring it hard and unpalatable; but it supplies a real want, is extensively used, and since its installation I have not been called upon to treat, nor have I heard of, a case of dysentery in the village.

I have already drawn attention to the insanitary condition and inadequacy of the cemetery in Dennery which, within the recollection of the oldest inhabitant, has ever been in use for the whole of the Dennery district, and whose area has greatly diminished by sea encroachment during past years. The population has increased with the march of time, and a cemetery of one and a half acres cannot be deemed sufficient on hygienic grounds to meet the requirements of so populous a district. The

matter has received full consideration, and negotiation for purchase of suitable and available lands in the vicinity has taken place between the proprietor and the Government, and at no distant date, I hope, an obvious danger will be averted and remedied by the opening of a new cemetery placed under the authority of the Dennery Improvement Committee.

In such a large district, Dennery and Mabouya, with a population of 4,800 inhabitants, the total number of vaccinations is small and may be due to laxity on the part of parents, who need a gentle reminder of the requirements of the law. The vaccine lymph supplied has been uniformly good in quality, and only on two occasions do I remember having to revaccinate.

There were 140 deaths certified for the year; the mortality was rather heavy, principally of children and the aged, the casualty list among the latter being heaviest from January to March.

J. T. DE COTEAU, M.R.C.S.Eng., L.R.C.P.Lond.

RETURN OF DISEASES TREATED AT THE GROS-ISLET, CASTRIES, ANSE-LA RAYE, SOUFRIÈRE, CHOISEUL, CANARIES, DENNERY, MICOD AND RESSOURCE DISPENSARIES DURING THE YEAR 1916-17.

Malaria	...	...	...	...	2,136
Worms	...	...	...	...	2,446
Ankylostomiasis	...	...	...	...	200
Veneral diseases	...	...	...	...	504
Rheumatism	...	...	...	...	350
Diseases of alimentary system	...	...	...	...	734
" respiratory	...	...	...	...	596
" circulatory	...	...	...	...	153
" nervous	...	...	...	...	161
" urinary	...	...	...	...	201
" lymphatic	...	...	...	...	45
" kidneys	...	...	...	...	10
" skin and cellular tissue	...	...	...	...	370
" female generative organs	...	...	...	...	80
" male	...	...	...	...	7
" organs of locomotion	...	...	...	...	2
" eye	...	...	...	...	69
" ear	...	...	...	...	53
" nose and throat	...	...	...	...	96
Injuries to bones and joints	...	...	...	...	61
" general	...	...	...	...	99
Poisons	...	...	...	...	6
Tuberculosis	...	...	...	...	19
Ulcers	...	...	...	...	444
Yaws	...	...	...	...	432
Wounds	...	...	...	...	42
" septic	...	...	...	...	35
Abscess	...	...	...	...	118
Pregnancy	...	...	...	...	48
Abortion	...	...	...	...	4
Dysentery	...	...	...	...	62
Debility and senility	...	...	...	...	118
Dentition and teeth extractions	...	...	...	...	70
Leprosy	...	...	...	...	16
Lunacy	...	...	...	...	1
Hernia	...	...	...	...	41
Cancer	...	...	...	...	2
Pellagra	...	...	...	...	3
Filariasis	...	...	...	...	5
Tumours	...	...	...	...	31
Influenza	...	...	...	...	50
Typhoid fever	...	...	...	...	52
Tetanus	...	...	...	...	2
Elephantiasis	...	...	...	...	5
Miscellaneous	...	...	...	...	199

REPORT OF THE MEDICAL SUPERINTENDENT OF THE LUNATIC ASYLUM.

TOC LUNATIC ASYLUM.

Twenty-one patients remained at the end of March, 1916. Fifteen male and nine female patients were admitted, six male and five female patients were discharged, and two males and five females died. Of the eleven patients discharged three were cured, seven relieved, and one transferred to her native colony, St. Vincent.

The daily average number of patients was 74.6, and the number remaining in the asylum at the end of the year was seventy-seven.

The general health of the inmates was good, and the men placed a considerable amount of extra land under cultivation during the year.

No patients were mechanically restrained, and this mode of restraint may be said to be abolished. The number of patients requiring restraint by seclusion has become so small that the need for increased cell accommodation has totally gone.

The causes of insanity in this colony are difficult

to determine, chiefly owing to the difficulty of getting correct family and personal histories. Acquired syphilis does not lead to much insanity here owing to the infrequency with which the central nervous system is attacked, but it is probable that the children of syphilitic parents are frequently mentally unstable, or develop epilepsy, only to later form a considerable proportion of those who become insane.

Epilepsy is the apparent cause of the insanity in ten out of the seventy-seven patients remaining at the end of the year.

An analysis of the twenty-four patients who were admitted during the year shows the following causes: Five were due to senility, three to epilepsy, two to hereditary predisposition, one to alcoholism, one to syphilis and pellagra, one to cerebral softening following hæmorrhage, one to worry, three mad delusions of persecution associated with "obeah," and in seven no cause could be assigned.

ALAN KIDD, M.D., B.Ch.,
Medical Superintendent.

Colonial Medical Reports.—No. 89.—Trinidad and Tobago.

MEDICAL REPORT OF THE SURGEON-GENERAL FOR THE YEAR 1916.

COLONIAL HOSPITAL, PORT-OF-SPAIN.

OWING to the difficulty in obtaining the services of supernumerary surgeons to fill vacancies to complete the establishment, the staff was reduced on several occasions below the authorized standard. The strain and stress of work, however, was borne without a murmur or complaint in view of existing abnormal conditions.

Miss Grace Corder, Assistant Matron, who was seconded on June 27, 1915, for War Office work, is still engaged in her new sphere of labour. The office of Second Charge-nurse, which had become vacant, was filled by Miss Catherine Jones. The pressing call in England for nurses made it impossible to fill this post for some time.

In spite of the disabilities mentioned above the standard of efficiency has, I venture to believe, been maintained at a high level during the year under review.

Training of Nurses, Midwives and Dispensary Students.—In addition to the professional duties of the staff, courses of lectures on medical, surgical, and gynaecological nursing, including elementary physiology and anatomy, as well as midwifery and hygiene of infancy, were delivered to the nurses in training. Instruction in dressing and bandaging and also in the action and dosage of simple drugs were given. Valuable assistance in connection with

the teaching and training of nurses was given by the Matron.

There is also at the hospital a School of Dispensing for the training of dispensary students. The course of instruction includes teaching in elementary chemistry, in pharmacy and materia medica, in the compounding and dispensing of medicines as well as in dressing and bandaging. While practical knowledge of dispensary work was imparted by the Chief Dispenser and his assistants, a systematic course of lectures was given by the Medical Staff in addition to special instruction in dressing and bandaging.

The buildings generally are in fair order. The erection of a new tuberculosis ward is nearing completion. This ward is intended for the reception of "open cases," or patients in the advanced stage of the disease who are a danger to their families and associates, especially when they are confined to small and ill-ventilated rooms.

The grounds and walks have been kept in good order. The water supply, which is obtained from the city mains, is plentiful and of good quality; the drinking water is filtered through Berkefeld filters before use.

During the period under review 4,807 cases were treated; 3,867 were discharged, and 637 died. There remained in hospital at the close of the year 303 patients.

Five hundred and fifty-one children, of whom

308 were under 5 years of age, were admitted to the children's ward. In a large number of instances these little patients were brought in a moribund condition, showing negligence, indifference or ignorance on the part of the parents. While our total mortality rate was 13.25 per cent., the death-rate among the above mentioned 308 cases was 27.6 per cent. This brings me to the question of infantile mortality.

Owing to the many and varied influences at work the problem is a complex and intricate one. Before embarking, therefore, on a campaign to combat the evil, it would be wise to study carefully local conditions and to institute inquiries as to the evil influences in operation. In this way only may remedial and preventive measures be adopted with reasonable prospects of success.

Speaking generally, illegitimate births, parental ignorance, poverty, insanitary conditions and inaccessibility of skilled assistance during and after labour are dominating factors in the causation of infantile mortality, and in the great majority of cases several causes are combined. Some of these evil agencies can be combated only by the diffusion of education among the masses, and in connection with this matter it is satisfactory to note that the important subjects of domestic hygiene and the laws of health now receive attention in the school curriculum. It would be well, however, to include some instruction on the care of young children.

To remedy the evil conditions of environment we must look to the Government and the municipalities, and here again wise and useful measures are being introduced to promote the object in view. While general sanitation undoubtedly plays an important part in reducing maternal and infantile mortality, the quality and availability of skilled assistance before, during and after labour are factors of moment, and it is with reference to this aspect of the question that this institution may claim some credit for doing its bit towards the attainment of the desired end. Port-of-Spain fortunately occupies a relatively favourable position in regard to this matter. The supply in the town of competent midwives who have received their training at the Colonial Hospital is, I think, adequate to the public needs, and the extern maternity established in 1914 in connection with our maternity ward for the benefit of the poorer classes provides the parturient woman with skilled assistance.

There were seventeen stillbirths and three premature births; seven infants died within a few hours after birth.

The work of our nurse-midwives does not begin or end with the management of labour; they devote to the expectant mother as much time as circumstances permit, giving such advice as may be necessary to guide her safely to term; they also take an

interest in the after-care of the infant during and after their attendance on the mother, and endeavour to impart the principles which should guide the parent in the proper management and feeding of her infant.

One thousand six hundred and seventy visits were paid to mothers after delivery, and 186 to infants after the mother had recovered from the puerperium. There were also 180 visits to prospective mothers to whom such advice as appeared necessary was given.

From this brief review it will be seen that something is being done by our staff to reduce the high mortality rate among infants. This work is at present on a small scale and in a limited range in view of the fact that there are only two nurse-midwives detailed for this duty, but the results are encouraging.

The opportunities for further saving of infant life are by no means exhausted by the measures now in operation. Further efforts are necessary to ensure the continuity of the proper care and management of the infant especially during the first year of its existence.

The most fruitful causes of deaths among infants under 1 year of age in Port-of-Spain are diarrhoeal diseases, pulmonary affections, congenital debility, marasmus and tetanus neonatorum. Most of the conditions are well within the range of preventive medicine.

Probably the appointment of health visitors to visit the dwellings of the poor and to endeavour to instruct women in the proper methods of feeding and rearing infants and in the elements of general hygiene would yield the best results, as the high infantile death-rate appears to be due in large measure to neglect and ignorance on the part of the mothers among the lower classes here. It would be well if our nurse-midwives could keep in touch with their maternity cases for twelve months after the confinement until, at any rate, we have reached the stage outlined above. The contemplated establishment of a mothers' and infants' clinic at the Colonial Hospital should prove a useful measure towards the conservation of infant life.

The vital statistics show that the percentage of stillbirths is large, and that prematurity and congenital debility are remarkably common causes of death in the colony. Investigations into the effect of the nutrition of the mother on the infant have shown conclusively that a state of poor nutrition of the mother at the time of labour due to bad and insufficient food greatly increases the percentage of premature and stillbirths and influences adversely post-natal infantile mortality. This is, of course, a great social problem intimately connected with the question of infant welfare and therefore well worthy of consideration.

Colonial Medical Reports.—No. 89.—Trinidad and Tobago
(continued).**ABDOMINAL SUB-TOTAL HYSTERECTOMY.**

There is no more fascinating subject in gynaecology than fibromyoma of the uterus. It is of great practical as well as of academic interest. The mystery involved in the origin and life history of these tumours; the various symptoms, complications and degenerations associated with their growth; the dangers inherent in their natural course; their sinister influence on conception, pregnancy and parturition; their relation to sterility and the menopause; and finally, the indications and contraindications for their removal, are questions of the deepest interest to the gynaecologist.

As the solution of the various problems involved can only be obtained by the detailed analysis of a large number of cases, a careful record of those who come under our observation is kept with the view of contributing later on our share to the study of this subject. The condition is very common here, and a large number of women continue to seek surgical aid for its relief.

During the year under review twenty-five sub-total hysterectomies were performed for this affection without a single fatal result. The operation was performed in fifteen cases for bleeding, in six for constant pain, and in four for bladder trouble. Repeated and severe hæmorrhages had reduced some of the patients to a marked condition of anæmia and debility necessitating careful treatment and feeding before they could be subjected to operation. Menorrhagia was usually associated with submucous growths, while pain was present in the subserous variety. The latter symptom, however, was mainly due to adhesions and adnexal diseases, while vesical trouble was referred to impaction of the growth in the pelvis. It is interesting to note that the size of the tumour alone is seldom the single factor in the production of pain. As an average there is in my experience less pain in the large tumours than in the small and middle-sized ones.

The ages of the patients in this series were in six cases between 20 and 30 years, in eleven between 30 and 40 years, and in eight between 40 and 50 years. None had reached the climacteric. The effect on child-bearing as illustrated by these cases is instructive. Fourteen had never been pregnant, one had two children, and the remaining ten had borne one child each. The age of the youngest child in these cases was 7 years.

The principal complications met with were diseases of the tubes and ovaries, impaction of the tumour in the pelvic cavity and adhesions. Regressive changes were found in eight cases, and were exemplified by calcareous, cystic, mucoid and red degenerations. In one case there was a most interesting sequela, namely, abundant mammary secretion of milk, which followed nineteen days after the operation in a nulliparous patient aged 36. This condition persisted for some weeks. In this

case the ovaries were not removed. As we still hold the view that the ovaries should be preserved in every woman who has not reached the menopause unless they are distinctly diseased, these organs were spared as much as possible. In only four cases was it found necessary to extirpate both ovaries. In twelve instances one ovary had to be sacrificed, and in the remaining nine cases both were conserved. The following four cases presented special features which demand some reference.

Case I.—This refers to a well-nourished multipara, aged 40, on whom laparotomy had been performed several months previous apparently with a view to hysterectomy. The operation was discontinued, as there arose some doubt as to the presence of a fetus in the uterus. This shows how closely pregnancy and fibroids simulate each other sometimes, making clinical differentiation very difficult. When the patient came under my observation the question of pregnancy was readily excluded owing to the time that had elapsed since the attempted operation. The tumour in this case was soft and had undergone "red" degeneration.

Case II.—A well-nourished multipara, aged 29, was admitted with a soft abdominal tumour simulating a gravid uterus at the sixth month of gestation. The breasts were large and full and contained colostrum. The areolæ were wide and dark. The os was soft and partly obliterated, but no fetal heart sounds were audible, and according to the patient's statement her menses had been quite regular. The doubt concerning the nature of the uterine enlargement led me to postpone operative interference for two months in order to arrive at a positive diagnosis. The condition proved to be a fibroid which had undergone mucoid degeneration.

Case III.—A thin, anæmic, weakly woman, aged 32, who had had uterine polypi removed on two previous occasions, was admitted for the third time with a large, sloughing, gangrenous, submucous fibroid lying in the vagina. It was extirpated with the *ecraseur*, but further examination revealed the presence of several growths in the uterus. As soon as the patient had got rid of the septic vaginal discharge and had regained her strength, abdominal hysterectomy was performed to prevent a further recrudescence.

Case IV.—A poorly-nourished, anæmic woman, aged 28, was admitted with a large swelling occupying nearly the whole of the abdomen. Laparotomy revealed several small fibroids of the uterus complicated with a large ovarian cyst of the left ovary. The ovarian tumour was adherent to the omentum and intestines, and presented some difficulty in its removal. The cyst contained ten pints of dark grumous fluid.

The twenty-five cases operated upon during 1916 completed a series of 105 consecutive sub-total hysterectomies performed since April, 1913, with only two fatalities—an eminently satisfactory record which is enhanced by the fact that there has not been a single death among our last fifty-four cases.

ABDOMINAL PANHYSTERECTOMY FOR

(I) *Hydatiform Degeneration of the Chorion*.—A moderately nourished woman, aged 30 years, was admitted with a history of frequent vomiting, amenorrhœa for two months, followed by irregular hæmorrhages *per vaginam*, pain in the lower abdomen, and a tender, rapidly growing uterine tumour reaching to about 1 in. above the umbilicus. The case proved to be one of myxomatous degeneration of the chorion, and was treated by abdominal extirpation of the uterus. Convalescence followed a normal course.

Owing to the inherent danger of this condition, but especially to the possible subsequent development of chorio-epithelioma—the most rapidly fatal malignant growth with which we are acquainted—the weight of opinion demands not only the emptying of the uterus, but its extirpation as soon as a positive diagnosis is made.

(II) *For Uterine Fibroids*.—Total hysterectomy was performed on a case of uterine fibroids owing to cervical involvement, but death supervened forty-three hours after the operation from pulmonary embolism, the most tragic and fatal sequel to abdominal hysterectomy.

(III) *For Cancer of the Uterus*.—Nearly all the cases of uterine cancer that came to us afforded a hopeless outlook and too great hazard from the surgical standpoint. It is very difficult to spread knowledge of the subject to the lay world, and only a campaign of popular education can bring about the desirable end. I suspect that the terror inspired by the knife is also responsible in many instances for the fatal delay in obtaining competent advice.

During the year under review twenty-eight women with cancer of the womb were admitted to the hospital; all the cases except two were parous women, and their ages ranged between 25 and 64 years. In only nine cases was operation considered advisable, and two of these declined surgical intervention.

Of the nineteen inoperable cases five died in the course of the year, four of them within a week of their admission to hospital. This gives an idea of the hopeless condition in which some of these cases filter to this institution.

Abdominal panhysterectomy was performed on two and vaginal hysterectomy on five cases. The abdominal cases made good recoveries, and so far have not shown any sign of recurrence. One of them, however, was re-admitted four months after the operation with acute intestinal obstruction, which was relieved by separating the adhesions which had caused it. The other case presented a rather interesting condition in the course of the operation. A smooth rounded mass of stony hardness about the size of a marble was found practically free in the peritoneal cavity.

One case on whom panhysterectomy was performed in May, 1915, returned with recurrence of the disease in the vaginal vault; she was re-operated upon with so far a successful result now nearly a year ago.

VAGINAL HYSTERECTOMY FOR

(1) *Cancer of the Uterus*.—This operation was performed on five cases of carcinoma uteri with one death which was due to suppurative nephritis, and occurred seven weeks after the operation in a woman aged 62 years. Of the four cases which were discharged apparently well, one returned with early recurrence, or rather continuation of the disease, as the primary condition was too advanced for complete eradication.

(2) *Prolapse of the Uterus*.—A well-nourished woman, aged 40, was admitted with complete prolapse of the womb and ulceration of the cervix. Much difficulty was encountered in this case owing to old parametric inflammation and dense adhesions. After a long convalescence the patient was discharged well.

ABDOMINAL MYOMECTOMY.

Myomectomy is the ideal operation for fibromyoma uteri; it consists in the removal of one or more fibroids from the uterus without the sacrifice of any material portion of that organ. It causes no climacteric symptoms, and most important of all does not sterilize the patient. In actual practice, however, it can be carried out in only a small proportion of cases, as its field of usefulness is limited by various contra-indications.

We seldom perform it, as our experience coincides with the observation that fibroid tumours of the uterus are generally multiple, and that seedling or latent fibroids are present in almost every case.

These are liable to escape detection even during operation, and by their subsequent growth make a second operation necessary. Another point is that myomectomy is more dangerous than hysterectomy, and this constitutes in our judgment an important base for the selection of one operation or the other.

A pregnant woman with myoma uteri came under my care in the course of the year and presented all the conditions favourable to the conservative operation. She was young, newly married, and about four and a half months pregnant. The tumour was small, subserous and apparently single. Surgical intervention was urged on account of severe pain and the fear of red degeneration, a serious retrogressive change which frequently occurs in fibroids during pregnancy, and which indeed had already begun in this case. The operation offered no special difficulty, and was followed by no untoward result. The pregnancy ran a normal course, and four months and seventeen days after the operation the patient was safely delivered of a healthy full-term child.

VAGINAL MYOMECTOMY.

This operation was performed on five cases during the year with successful results. In one case it was undertaken for the third time to relieve a patient who presented a large fetid mass protruding through the cervix into the vagina.

In view of the frequent recurrences and the pre-

RETURN OF DISEASES AND DEATHS IN 1916 IN THE SAN FERNANDO AND DISTRICT AND YAWS HOSPITALS,

Trinidad.

GENERAL DISEASES.

	Admissions	Deaths	Total Cases Treated
Alcoholism .. .. .	..	..	3
Anæmia	45	11	53
Anthrax .. .. .	..	..	..
Beriberi .. .. .	..	..	..
Bilharziosis .. .. .	..	..	..
Blackwater Fever .. .. .	..	..	..
Chicken-pox	2	..	2
Cholera .. .. .	..	..	..
Choleraic Diarrhœa .. .. .	..	..	..
Congenital Malformation .. .. .	..	..	..
Debility	34	16	34
Delirium Tremens .. .. .	..	..	..
Dengue .. .. .	..	..	..
Diabetes Mellitus	7	..	7
Diabetes Insipidus .. .. .	..	..	..
Diphtheria .. .. .	..	..	..
Dysentery	302	77	313
Enteric Fever	166	33	180
Erysipelas	7	..	7
Febricula .. .. .	..	..	..
Filariasis	7	..	7
Gonorrhœa	54	..	55
Gout .. .. .	..	..	..
Hydrophobia .. .. .	..	..	..
Influenza .. .. .	..	..	..
Kala-Azar .. .. .	..	..	..
Leprosy .. .. .	..	..	..
(a) Nodular	1	..	1
(b) Anæsthetic .. .. .	..	..	..
(c) Mixed .. .. .	..	..	..
Malarial Fever— .. .. .	..	..	..
(a) Intermittent .. .. .	..	..	..
Quotidian .. .. .	..	..	..
Tertian	304	16	313
Quartan .. .. .	..	..	..
Irregular .. .. .	..	..	..
Type undiagnosed .. .. .	..	..	..
(b) Remittent	68	3	68
(c) Pernicious .. .. .	..	..	..
(d) Malarial Cachexia	28	..	28
Malta Fever .. .. .	..	..	..
Measles .. .. .	..	..	..
Mumps .. .. .	..	..	..
New Growths— .. .. .	..	..	..
Non-malignant .. .. .	..	..	..
Malignant .. .. .	..	..	..
Old Age	29	7	33
Other Diseases	95	30	95
Pellagra	2	1	2
Plague .. .. .	..	..	..
Pyæmia	2	1	2
Rachitis .. .. .	..	..	..
Rheumatic Fever .. .. .	..	..	..
Rheumatism	107	1	108
Rheumatoid Arthritis	3	..	3
Scarlet Fever .. .. .	..	..	..
Scurvy .. .. .	..	..	..
Septicæmia	3	3	3
Sleeping Sickness .. .. .	..	..	..
Sloughing Phagedæna .. .. .	..	..	..
Small-pox .. .. .	..	..	..
Syphilis .. .. .	..	..	..
(a) Primary	2	..	3
(b) Secondary	43	..	43
(c) Tertiary	60	3	62
(d) Congenital	8	3	8
Tetanus .. .. .	..	..	..
Trypanosoma Fever .. .. .	..	..	..
Tubercle— .. .. .	..	..	..
(a) Phthisis Pulmonalis .. .. .	..	..	..
(b) Tuberculosis of Glands .. .. .	..	..	..
(c) Lupus .. .. .	..	..	..

GENERAL DISEASES—continued.

(d) Typhus Mesenterica .. .. .	..	..	..
(e) Tuberculous Disease of Bones .. .. .	..	..	..
Other Tubercular Diseases	8	4	8
Varicella .. .. .	..	..	..
Whooping-cough	15	1	16
Yaws	1,436	..	1,641
Yellow Fever .. .. .	..	..	..

LOCAL DISEASES.

Diseases of the— .. .. .	..	..	..
Cellular Tissue	222	4	225
Circulatory System .. .. .	..	..	..
(a) Valvular Disease of Heart	44	9	50
(b) Other Diseases	75	29	78
Digestive System— .. .. .	..	..	..
(a) Diarrhœa	117	38	120
(b) Hill Diarrhœa .. .. .	..	..	..
(c) Hepatitis	5	..	5
Congestion of Liver	4	..	5
(d) Abscess of Liver	4	..	4
(e) Tropical Liver .. .. .	..	..	..
(f) Jaundice, Catarrhal .. .. .	..	..	..
(g) Cirrhosis of Liver	183	74	191
(h) Acute Yellow Atrophy .. .. .	..	..	..
(i) Sprue .. .. .	..	..	..
(j) Other Diseases	249	26	253
Ear	21	..	21
Eye	100	..	106
Generative System— .. .. .	..	..	..
Male Organs	360	3	370
Female Organs	359	13	366
Lymphatic System	183	10	200
Mental Diseases	40	..	40
Nervous System	112	28	120
Nose	26	..	26
Organs of Locomotion	127	2	133
Respiratory System	419	122	433
Skin— .. .. .	..	..	..
(a) Scabies .. .. .	..	..	..
(b) Ringworm	1	..	1
(c) Tinea Imbricata .. .. .	..	..	..
(d) Favus .. .. .	..	..	..
(e) Eczema	17	..	17
(f) Other Diseases	560	7	588
Urinary System	293	70	310
Injuries, General, Local— .. .. .	..	..	..
(a) Siriasis (Heatstroke) .. .. .	..	..	..
(b) Sunstroke (Heat Prostration) .. .. .	..	..	..
(c) Other Injuries	610	8	629
Parasites— .. .. .	..	..	..
Ascaris lumbricoides	3	1	3
Oxyuris vermicularis .. .. .	..	..	..
Dochmius duodenalis, or Ankylostoma duodenale	655	80	680
Filaria medinensis (Guinea-worm) .. .. .	..	..	..
Tape-worm .. .. .	..	..	..
Poisons— .. .. .	..	..	..
Snake-bites .. .. .	..	..	..
Corrosive Acids .. .. .	..	..	..
Metallic Poisons	3	..	3
Vegetable Alkaloids	6	1	6
Nature Unknown .. .. .	..	..	..
Other Poisons	32	..	32
Surgical Operations— .. .. .	..	..	..
Amputations, Major .. .. .	..	..	..
" Minor .. .. .	..	..	..
Other Operations	968	8	968
Eye .. .. .	..	..	..
(a) Cataract	15	..	15
(b) Iridectomy .. .. .	..	..	..
(c) Other Eye Operations	10	..	10

sence of numerous small growths in the uterus, abdominal hysterectomy was performed as soon as she had recovered from the myomectomy and conditions were favourable for the major operation.

OVARIOTOMY FOR

A.—*Dermoid Cysts*.—There were three cases of this condition, for which ovariectomy was performed with successful results.

In one case a dermoid cyst of the size of a cricket ball was found in each ovary and contained hair and much fatty matter. In one of them was also found a tooth.

In another case a very large ovarian cyst containing a gallon of dark fluid and two daughter cysts were removed. The daughter cysts contained a thick, yellow, oily fluid and hair. In this case the left ovary, which was found to the right of the uterus was excised, and on section presented a tiny dermoid cyst with a tuft of hair.

In the third case the condition suggested a floating kidney, but on opening the abdomen a firm rounded tumour about the size of a foetal head presented itself just beneath the liver. It was connected with the broad ligament by a long pedicle. On opening the tumour after its removal it was found to contain thick, yellow, pulaceous matter and several balls of matted hair.

It is interesting to note that in two of these cases the condition was bilateral.

B.—*Unilocular Cysts*.—There were two cases of this affection to whom operation brought a permanent cure. In one case the tumour contained seven and a half pints of dark fluid, which had to be withdrawn before delivery of the growth could be effected. In the other case the tumour was so firm that it suggested at first a fibroid of the uterus.

C.—*Fibromyoma*.—This refers to a case which demands special notice on account of the rarity of the condition and the post-operative history of the patient. Of all the pelvic tumours fibromyoma of the ovary is perhaps the rarest. I have seen hundreds of fibromyomas of the uterus, but this is the first case of ovarian fibroid that has come under my observation.

The patient, a woman aged 44, complained of occasional pelvic pain and amenorrhœa for four months, and presented a firm, rounded, freely movable tumour about the size of a foetal head in the right lower quadrant of the abdomen. On palpation the tumour gave a sense of hardness suggesting a calcareous mass, and was thought at first to be a degenerated subserous fibroid of the womb. On opening the abdomen the growth was traced to the right ovary. The pedicle which was formed by the broad ligament was ligatured and the tumour excised. There were some adhesions to the small intestine, but these were readily separated. The other ovary was small and indurated. The uterus was normal in size and apparently quite free from growths. On section the tumour displayed the peculiar whorled appearances so characteristic of

fibromyoma of the uterus, and microscopic examination showed it to be a typical fibromyoma. Two days after the operation the patient developed an acute attack of dysentery which yielded to emetin, but she was left in a weak condition, and as she began to improve acute pleurisy of the right side supervened, followed twelve days later by a similar condition of the left pleura which further retarded her progress. After a stormy and long convalescence complete recovery resulted.

SALPINGO-OOPHORECTOMY.

(1) A poorly nourished young primipara, aged 16 years, was admitted in a collapsed and intensely anæmic condition with evidence of a ruptured ectopic sac. On opening the abdomen much blood was found in the peritoneal cavity, and lying free among the coils of intestine was a three months foetus which had escaped from the ruptured sac in the right Fallopian tube. The sac was excised and the abdominal cavity cleansed and washed out, but the patient never rallied, and death followed about two hours after the operation.

(2) In a case of bilateral hydrosalpinx with cystic degeneration of the ovaries the tubes and portions of the ovaries were successfully removed.

APPENDICECTOMY.

There is no subject in the whole range of surgery upon which there has been such diversity of opinion as the treatment of acute appendicitis, and even now the question of when to operate in these cases has not been definitely settled. My rule is to operate without any hesitation in the primary period of the disease—that is, within twenty-four hours of the onset of symptoms if the case is seen or diagnosed early enough. The same course is followed in the abscess stage, and also in the quiescent period when the acute attack has completely subsided. During the year under review no case in the primary stage came under my observation. One patient who was admitted with an acute attack of five or six days duration developed an appendicular abscess which was incised and drained with successful result. Twelve days after the abscess was opened an orange pip came away in the discharges. Eight cases were operated upon in the quiescent period—the most favourable stage for operation—with no death. The ages of the patients ranged from 15 to 24 years. Six of them had had more than one attack. Curiously enough, all the cases except one were females, four of whom belonged to our nursing staff. In nearly every case adhesions were encountered, but these presented no serious difficulty in the course of the operation.

When one comes to decide upon a line of treatment in the intermediate stage—that is, after the lapse of twenty-four hours or before abscess formation or complete subsidence of the condition has taken place, one is confronted with perhaps the most difficult question which presents itself in surgery.

Colonial Medical Reports.—No. 89.—Trinidad and Tobago
(continued).

There is no class of case in which I have felt more difficulty in coming to a decision than in cases of acute appendicitis seen on the third, fourth, or fifth day of the disease or later. In these circumstances every case should be judged for itself, and here the exercise of the highest surgical judgment is required to determine whether immediate interference or watchful delay will be more likely to bring about recovery.

ENTERECTOMY.

This operation was performed on a poorly nourished man, aged 50 years, who was admitted to hospital with a strangulated inguinal hernia. On opening the hernial sac and exposing its contents a large hematoma of the mesentery was observed. As it threatened the vitality of a portion of the bowel it was decided to excise it with the corresponding portion of small intestine which obtained its blood supply from that sector of the mesentery. About 6 in. of the gut was removed, and the continuity of the intestinal canal was accomplished by means of a Murphy's anastomosis button. At no time did the patient give any cause for anxiety; he made a good recovery, and passed the button twenty-seven days after the operation.

NEPHRECTOMY.

An emaciated cachectic-looking woman, aged 24 years, was admitted in an extremely weak condition with a history of pyuria and pain in the left loin for six weeks. Examination revealed the presence of a large fluctuating swelling in the region of the left kidney. The urine was examined for tubercle bacilli with negative result, and the inoculation of a guinea-pig with the urinary deposit was attended with a similar result. It was clear, however, we were dealing with a large abscess of the left kidney which demanded immediate removal. After much delay and hesitation on the part of the patient the diseased organ was removed through the lumbar route. It was completely disorganized by an abscess, and contained in its pelvis a calculus. Owing to her extreme debility the patient rallied with difficulty and caused grave anxiety. Persistent vomiting complicated the condition, and it was only after about four weeks that some sign of improvement became apparent. The one encouraging and hopeful feature in the case during those anxious days was the free secretion of urine which showed that the remaining kidney was active. During the first two weeks after operation she passed a daily average of 46 oz. of urine. The operation wound took a considerable time to heal, and severe neuritis of the lower extremities, followed later on by paresis, resulted. After careful nursing during a slow and tedious convalescence she eventually made good progress, and was discharged seventy-seven days after the operation.

SPLENECTOMY.

A fairly well-nourished woman, aged 36 years, was admitted to hospital complaining of severe and constant pain over the spleen, which was enormously enlarged. Blood examinations, including a differential blood count, threw no light on the nature of the enlargement. There was no history of malaria, and no malarial parasites were found in the blood. Leishman-Donovan's bodies were looked for in the fluid obtained from a puncture of the liver with negative results. It may be noted that these bodies have never been detected here, so that kala-azar appears to be an affection which does not occur in the colony. At any rate, there is so far complete absence of bacteriological proof of its existence here.

Owing to the persistent pain and the insistent request of the patient for operative interference removal of the spleen was decided upon. On opening the abdomen the lower pole of the spleen was found to be completely invested with the omentum, and the upper pole so closely adherent to the diaphragm and pancreas that the greatest difficulty was experienced in its removal, which was followed by considerable hemorrhage. Twenty-five hours after the operation the case terminated fatally from cardiac syncope. The cause of pain in this case was no doubt due to the adhesions around the enlarged spleen, which weighed 4 lb. 14 oz., i.e., about sixteen times the weight of the normal organ.

LAPAROTOMY.

A.—For Intestinal Obstruction: (1) Volvulus of the Sigmoid Flexure.—A fairly nourished woman, aged 43, was admitted to hospital with a history of intestinal obstruction and a greatly distended and tympanitic abdomen. She had been operated upon nine months previously for volvulus of sigmoid flexure. On opening the abdomen a similar condition was found. The volvulus was untwisted without any difficulty, and the case gave no further trouble.

(2) *Intussusception.*—A well-nourished male child, aged 1 year, was taken to hospital with a history of sudden vomiting, followed by the passage of blood and mucus *per rectum*. On admission the child was quite apathetic. His temperature was 99° F. and his pulse very rapid. Examination of the abdomen revealed a movable mass in the right upper quadrant. On rectal examination nothing abnormal was felt, but on withdrawing the finger much blood and mucus came away. As there was no doubt about the diagnosis it was decided to operate at once. On opening the abdomen it became evident that the cæcum, appendix and a few inches of the ileum were invaginated within the lumen of the ascending colon. This was readily reduced, the operation occupying only thirteen minutes. Very little shock followed. The temperature, however, kept up for a week after the operation, ranging between 99° F. and 104.4° F.,

and appeared to be due to malaria, although blood examinations failed to reveal the presence of the parasites. The blood was also tested for Widal reaction with a negative result. An interesting feature in this case was the apparent absence of pain even during the manipulation of the intussuscepted bowel. The little patient was discharged well nineteen days after the operation.

(3) *Bands and Adhesions.*—(a) An ill-nourished woman, aged 50 years, on whom abdominal hysterectomy had been performed four months previously for cancer of the womb, returned with signs and symptoms of intestinal obstruction. On re-opening the abdomen a good deal of blood-stained fluid escaped, and a tight constriction of the small intestine by a band of adhesion was revealed. The condition was relieved, and nineteen days after the operation the patient was discharged well.

(b) A well-nourished woman, aged 49 years, on whom abdominal hysterectomy had been performed five years ago for the relief of a huge uterine fibroid complicated with adhesions, was admitted with a history of occasional attacks of vomiting and pain in the right lower abdomen for two years. The symptoms had become more marked during the last eight weeks. Laparotomy revealed omental and intestinal adhesions which were constricting the lumen of the small bowel in several places. The adhesions were separated, and the patient was discharged twenty-two days after the operation.

(c) In the third case—a man, aged 48—was admitted in a very poor condition with evidence of intestinal obstruction. On opening the abdomen a tight band constricting the small intestine was found. The constricted portion of the gut was ulcerated through in parts, allowing the intestinal contents to escape. The band was incised and the perforated intestine sutured, but the patient died twelve hours after the operation.

B.—Penetrating Wounds of the Abdomen.—*Case I.*—A well-nourished boy, aged 8 years, was admitted in a collapsed condition with a history of having fallen upon the spike of an iron railing. Examination showed a punctured wound of the abdominal wall in the region of the right iliac fossa and protrusion of the omentum through the wound. Under chloroform anaesthesia the wound was enlarged for the purpose of exploring the peritoneal cavity, but no sign of internal injury was found. The extruded portion of the omentum was excised, and the abdominal wound closed after careful cleansing of the peritoneal cavity.

Case II.—A moderately nourished anæmic boy, aged 7 years, was brought to hospital suffering from a punctured wound of the abdomen in the right iliac region and a considerable amount of shock. He had fallen from a tree and had become impaled upon the iron spikes of a railing. A portion of the omentum was hanging out of the wound. Under a general anaesthetic the wound was extended to permit of the exploration of the abdominal cavity—no internal injury was detected. Part of the

prolapsed omentum was removed and the wound closed.

It is a curious coincidence that the injury in both cases was similar in every respect and occurred practically in the same way. Apart from slight irregularity of the heart in the second case, which lasted for about three days after the operation, there were no untoward symptoms. Both cases made rapid recoveries.

C.—Pelvic Abscess.—A well-nourished woman, aged 40 years, was admitted with a large pelvic abscess. The abdomen was opened and the pus evacuated. A counter opening was made in the posterior fornix to assist drainage *per vaginam*. The patient made an uneventful recovery.

SAN FERNANDO HOSPITAL, 1916.

The grounds were kept in a satisfactory order. The water supply was sufficient and of good quality. The drainage was efficient and the drains in good condition.

The Sanitary Conditions.—The flyproofing of the latrines was partially accomplished, and will, I hope, be completed during the year. This is very desirable in view of the fact that the "pail system" is in vogue at this institution, where a large number of the patients are uneducated East Indians with undesirable habits.

The dietary continues to be satisfactory.

The chief diseases admitted and treated were as follows:—

Ankylostomiasis.—The continued yearly increase of admissions from this disease will form a serious problem unless effective preventive measures can be adopted. The treatment for this condition with chenopodium oil has been given a very extensive trial at this institution with very good results. It has the additional advantages of being the cheapest anthelmintic that can be employed as well as being equally effective in its action on the majority of other intestinal parasitic affections. It seems to act best combined with pure chloroform and castor oil. The only objectionable symptom observed, which is, however, an advantage from a diagnostic standpoint, is the occasional presence of an excess of mucus in the stools after its administration. In such cases it has been found that the patients have been also suffering from latent amoebiasis, necessitating treatment by emetin and the replacing of chenopodium oil with thymol and Epsom salts.

Cirrhosis of Liver caused the largest number of deaths (sixty-one). Here also ankylostomiasis should not be overlooked as regards the part it plays in the production of this incurable condition. *Post-mortem* examinations at this hospital in a large number of cases of ankylostomiasis in its various stages reveal a pathological condition of the liver, ranging from well-marked fatty degeneration to advanced cirrhosis. The toxic origin of the cirrhosis admits of little doubt, and it is therefore reasonable to conclude that the fatty condition produced by

RETURN OF DISEASES AND DEATHS IN 1916 IN THE COLONIAL HOSPITAL,

Trinidad.

GENERAL DISEASES.

	Admissions	Deaths	Total Cases Treated
Alcoholism	4	—	4
Anæmia	9	1	9
Anthrax	—	—	—
Beriberi	3	—	3
Bilharziosis	—	—	—
Blackwater Fever	—	—	—
Chicken-pox	5	—	5
Cholera	—	—	—
Choleraic Diarrhœa	—	—	—
Congenital Malformation	—	—	—
Debility	26	14	27
Delirium Tremens	1	—	1
Dengue	—	—	—
Diabetes Mellitus	3	1	3
Diabetes Insipidus	2	—	2
Diphtheria	9	2	9
Dysentery	—	—	—
Enteric Fever	182	30	201
Erysipelas	—	—	—
Febricula	—	—	—
Filariasis	3	—	3
Gonorrhœa	54	—	55
Gout	—	—	—
Hydrophobia	—	—	—
Influenza	7	—	7
Kala-Azar	—	—	—
Leprosy	—	—	—
(a) Nodular	—	—	—
(b) Anæsthetic	—	—	—
(c) Mixed	5	—	5
Malarial Fever—	—	—	—
(a) Intermittent	—	—	—
Quotidian	—	—	—
Tertian	131	1	135
Quartan	—	—	—
Irregular	—	—	—
Type undiagnosed	—	—	—
(b) Remittent	—	—	—
(c) Pernicious	81	9	84
(d) Malarial Cachexia	10	2	12
Malta Fever	—	—	—
Measles	1	—	1
Mumps	1	—	1
New Growths—	—	—	—
Non-malignant	—	—	—
Malignant	—	—	—
Old Age	7	1	11
Other Diseases	181	32	184
Pellagra	6	4	6
Plague	—	—	—
Pyæmia	1	—	1
Rachitis	—	—	—
Rheumatic Fever	—	—	—
Rheumatism	23	—	25
Rheumatoid Arthritis	11	—	11
Scarlet Fever	—	—	—
Scurvy	—	—	—
Septicæmia	1	—	1
Sleeping Sickness	—	—	—
Sloughing Phagedæna	—	—	—
Small-pox	—	—	—
Syphilis	—	—	—
(a) Primary	21	—	21
(b) Secondary	18	—	19
(c) Tertiary	52	4	54
(d) Congenital	11	6	11
Tetanus	16	12	16
Trypanosoma Fever	—	—	—
Tubercle—	—	—	—
(a) Phthisis Pulmonalis	—	—	—
(b) Tuberculo-is of Glands	—	—	—
(c) Lupus	—	—	—

GENERAL DISEASES—continued.

(d) Tabes Mesenterica	—	—	—
(e) Tuberculous Disease of Bones	—	—	—
Other Tubercular Diseases	7	6	7
Varicella	—	—	—
Whooping-cough	3	—	6
Yaws	1	—	1
Yellow Fever	—	—	—

LOCAL DISEASES.

Diseases of the—			
Cellular Tissue	201	5	209
Circulatory System	—	—	—
(a) Valvular Disease of Heart	91	35	95
(b) Other Diseases	30	17	31
Digestive System—	—	—	—
(a) Diarrhœa	88	32	92
(b) Hill Diarrhœa	—	—	—
(c) Hepatitis	5	—	5
Congestion of Liver	1	—	1
(d) Abscess of Liver	8	2	10
(e) Tropical Liver	—	—	—
(f) Jaundice, Catarrhal	4	—	4
(g) Cirrhosis of Liver	43	17	45
(h) Acute Yellow Atrophy	1	1	1
(i) Sprue	—	—	—
(j) Other Diseases	473	62	487
Ear	6	—	7
Eye	165	—	168
Generative System—	—	—	—
Male Organs	258	6	269
Female Organs	550	23	571
Lymphatic System	64	2	68
Mental Diseases	56	—	59
Nervous System	121	23	125
Nose	18	—	18
Organs of Locomotion	71	4	81
Respiratory System	415	146	447
Skin—	—	—	—
(a) Scabies	—	—	—
(b) Ringworm	4	4	4
(c) Tinea Imbricata	—	—	—
(d) Favus	—	—	—
(e) Eczema	2	—	2
(f) Other Diseases	300	10	322
Urinary System	209	91	222
Injuries, General, Local—	179	7	191
(a) Siriasis (Heatstroke)	—	—	—
(b) Sunstroke (Heat Prostration)	—	—	—
(c) Other Injuries	—	—	—
Parasites—	4	—	4
Ascaris lumbricoides	3	2	3
Oxyuris vermicularis	—	—	—
Dochmius duodenalis, or Ankylostoma duodenale	175	14	184
Filaria medinensis (Guinea-worm)	—	—	—
Tape-worm	—	—	—
Poisons—	—	—	—
Snake-bites	—	—	—
Corrosive Acids	1	—	1
Metallic Poisons	3	—	3
Vegetable Alkaloids	7	—	7
Nature Unknown	—	—	—
Other Poisons	20	1	20
Surgical Operations—	1,708	25	1,708
Amputations, Major	—	—	—
Minor	—	—	—
Other Operations	—	—	—
Eye	—	—	—
(a) Cataract	20	—	20
(b) Iridectomy	—	—	—
(c) Other Eye Operations	35	—	35

ankylostomiasis renders the liver very much more amenable to other toxic influences (e.g., malaria and syphilis, &c.) in producing cirrhosis.

Dysentery.—Included exceptionally few cases of bacillary dysentery. Out of a total of fifty-three deaths, fifty-two were amebic dysentery as confirmed by the *post-mortem* examinations. In two cases the patient suffered from a mixed infection of both forms. Amebic dysentery is increasing, and is liable to do so, owing to its insidious character and liability to relapse. The period between infection and the appearance of symptoms has recently been established by experiments in men to average 64.8 days, and may even be as long as 95 days. Either this fact or its latency explains the subsequent appearance of symptoms in some of our patients admitted for other causes and with no suspicion of the disease on admission. The efficacy of subcutaneous injection of emetin was also further confirmed, especially in "acute" cases, as almost all the cases in which death occurred sought hospital treatment only after advanced destruction of the bowel wall had already occurred or where the resisting power of the patient was lowered by some complicating disease (usually ankylostomiasis); we have also become convinced of the necessity of employing a minimum course of 10 gr. of emetin to ensure an effective cure and avoid relapses. The only objectionable symptom observable after prolonged administration of the drug has been the appearance of cardiac irritability, necessitating a temporary cessation of its use in some few cases.

Malarial Fever.—171 admissions, three deaths, twenty-seven cases of malignant type. The malignant cases in this series were characterized by the presence in the majority of albuminuria; while in ten cases convulsions of varying severity occurred. In four cases signs of acute mental derangement persisted for weeks after the disappearance of all other symptoms.

Enteric Fever.—There was an increase of patients suffering from enteric fever during the year. The largest numbers were admitted in April, while the highest mortality occurred in August, September, and October. In two fatal cases perforation of the intestine occurred.

Acute Lobar Pneumonia.—The majority of cases occurred during the last quarter of the year.

Eclampsia.—The one death which occurred in the series of six cases treated is interesting, inasmuch as the patient was at least three days in labour previous to admission, the delay being due to a kyphotic pelvis. Delivery had to be instrumental, and although no convulsions occurred subsequently, she eventually succumbed apparently from exhaustion.

There were 983 surgical operations performed. The following are worthy of being recorded:—

Extra-uterine Pregnancy—"Lithopædion" or "Stone Fetus"—**Laparotomy**—**Salpingectomy**.—This extremely rare condition occurred in a woman who became pregnant at the beginning of

1914. She suffered from abdominal pains off and on for about four months, when she became very ill with symptoms of uterine hæmorrhage and severe abdominal pains. She recovered from the attack and noticed a movable tumour in her abdomen, which persisted with occasional abdominal pains and slight oozing *per vaginam*. On June 13, 1916, she was recommended to hospital for operative treatment for uterine fibroids. On admission she had a pedunculated hard tumour the size of one's fist in the abdominal cavity possessing great mobility, and another tumour adherent to the uterus on the right side, as also persistent oozing *per vaginam*. She was kept under observation until July 5, when laparotomy under chloroform was performed. A fœtus (four to five months), calcified to stony hardness, was found attached to the omentum amid the coils of the intestines and completely disconnected from the uterus, while attached to the right Fallopian tubes, which had ruptured, was a sac containing a shrivelled placenta. The fœtus was removed, omentum ligatured, right tube placenta and sac excised, and abdomen washed out, the patient making a complete recovery.

Extra-uterine Pregnancy—Abdominal Abortion (?)—**Laparotomy**—**Salpingo-oophorectomy**.—This patient was admitted with a cystic swelling, felt in the pouch of Douglas *per vaginam*, and an indefinite history suggestive of an ectopic pregnancy. She also had albuminuria. Under chloroform, laparotomy was performed revealing blood clots, a two-months old fœtus in the abdominal cavity, and a sac with placental tissue in the pouch of Douglas adherent to the large intestine. No rupture could be found in the Fallopian tube, but fimbriated end of the right tube was greatly dilated, suggesting a tubal abortion into the abdomen. The tube was ligatured, excised, and the blood clots evacuated. The left ovary, being cystic, was also excised. A small portion of the sac could not be excised, this necessitating leaving a drainage tube into the pelvis. An uninterrupted recovery ensued.

Extra-uterine Pregnancy—Suppurative—Laparotomy—**Salpingectomy**.—The history was two months amenorrhœa, hæmorrhage *per vaginam* 0.22 days. Her temperature was 102° F., and she had a bulging swelling in the posterior fornix. An exploratory puncture through the posterior fornix revealed the presence of offensive blood clots. The abdomen was therefore opened under chloroform, and a large cyst with faecal elements and blood clots—very offensive and purulent—was found and evacuated. The ruptured right Fallopian tube was ligatured, excised, and the abdomen drained. Her convalescence was protracted, but ended in recovery.

Myomectomy.—In three cases tumours were removed *per vaginam*. In two of these the growth, which had dilated and occupied the entire vaginal cavity, was so large that, after division of their pedicles, they had to be dissected before delivery could be effected through the vaginal orifice.

Colonial Medical Reports.—No. 89.—Trinidad and Tobago
(continued).

Bilateral Dermoid Cyst of the Ovaries—Ovariectomy.—This woman was admitted with history of a progressive enlargement of her abdomen. Under chloroform her abdomen was opened, revealing the presence of a large left ovarian cyst multiloculated, size of a full-term pregnant uterus, and extending up to the liver. A portion of its contents was evacuated and the cyst delivered and excised. The right ovary was also replaced by a smaller cyst, which was also excised. On examining the cysts both were found to be dermoids, containing a large quantity of hair, sebaceous material and teeth. She made a rapid recovery.

Perforation of Uterus—Closure by Sutures.—An anæmic woman was admitted with a tender and painful lower abdomen, purulent vaginal discharge, and quickening pulse. Laparotomy under chloroform revealed a very soft, friable, thin-walled uterus with a small perforation near its fundus. The perforation was closed with Lembert sutures and the abdomen closed. Her recovery was delayed by an attack of acute lobar pneumonia.

Ruptured Pyosalpinx—General Peritonitis—Laparotomy—Salpingectomy—Drainage.—This patient was admitted with fever and the history of having had a miscarriage (4-5 months) at home. She had retained placenta which was putrefying. This was removed bimanually. Eight days later she presented symptoms of commencing general peritonitis. Her abdomen was opened under chloroform revealing a ruptured left pyosalpinx; the tube was excised and abdomen drained—a good recovery resulting.

Pyosalpingitis—General Peritonitis—Colpotomy—Laparotomy—Artificial Anus.—This patient was admitted in October with a pelvic abscess and commencing general peritonitis. Posterior colpotomy and drainage were performed with only temporary relief. Under ether anaesthesia her abdomen was opened and drainage tubes inserted into both flanks and the pelvis. She then developed "ileus," and in spite of all treatment no action of her bowels could be obtained. The formation of an artificial anus had to be resorted to, since which time she has made a slow but gradual improvement.

Acute Gangrenous Perforative Appendicitis—Retrocaecal—Appendicectomy and Drainage.—An East Indian was admitted with sign of a spreading peritonitis from the appendix area. Under chloroform the abdomen was opened, purulent fluid escaped, and was traced to a small sinus over the usual site of the appendix; but it was not found until the posterior layer of peritoneum was opened up along the sinus tract and the appendix found post-cæcally gangrenous and with a large perforation. The appendix was separated, ligatured, removed, and the posterior parietal peritoneal incision completely closed over the stump by sutures. A drain was left in the pelvis for a few days, and the patient made a rapid and complete recovery.

Acute Gangrenous Appendix with Perforation—Appendicectomy and Drainage.—This patient was a eunuch, both testicles having been removed eight years previously owing to a crushing injury received in an accident. He was admitted with peritonitis, and under chloroform laparotomy revealed a large gangrenous appendix containing a concretion and perforated in its centre. The appendix was ligatured, excised, abdomen washed out, and both flanks drained. He eventually made a good recovery.

Suppurative Appendicitis with Peritonitis—Laparotomy and Drainage.—A boy, aged 7 years, was admitted with signs of suppurative appendicitis. He developed spreading peritonitis. The abdomen was opened, the appendix found to have sloughed away, and drainage tubes left *in situ*. A faecal fistula developed, but eventually closed after a protracted convalescence, ending in recovery.

Acute Appendicitis in a Strangulated Hernial Sac—Appendicectomy—Radical Cure.—This patient, aged 35 years, was admitted with a strangulated inguinal hernia. Under chloroform the sac was exposed, found to contain cæcum and appendix, the latter in an acute catarrhal stage. The appendix was ligatured and removed, while in attempting reduction of the cæcum, which was very oedematous, a slight rupture occurred in its wall, necessitating repair with Lembert sutures. The bowel was eventually reduced, the sac excised, and the muscular walls repaired. Recovery ensued.

Suppurative Appendicitis pointing in Hernial Sac—Herniotomy and Drainage.—A middle-aged man was admitted with the history of a strangulated inguinal hernia. He had a tender irreducible swelling in his right inguinal canal, but no symptoms of strangulation. Under cocaine anaesthesia the sac was exposed and found to contain omentum enclosing a collection of pus which could be traced upwards to an abscess cavity in the appendix region within the abdomen. The omentum was excised and the abscess drained via the inguinal canal with complete subsidence of all symptoms.

Rupture of Intestine—Laparotomy—Closure of Rupture.—An East Indian was admitted at 10.45 a.m. with the history of having been kicked on the abdomen by a mule at 8 a.m. As the symptoms indicated serious intra-abdominal injury, immediate operation was at once advised and consented to. At 11.30 a.m. under chloroform, his abdomen was opened revealing a rupture of the small intestine (ileum) with escape of some of its contents into the abdominal cavity. The rent in the bowel was sutured and the abdomen closed after being washed out. He was subsequently treated for ankylostomiasis previous to his discharge from hospital twenty-four days later.

Acute Intestinal Obstruction—Ascarides Lumbrioides—Enterotomy—Removal of Worms.—A boy, aged 4 years, was admitted to hospital with symptoms of acute intestinal obstruction, a tumour involving the small intestine and commencing peritonitis. The abdomen was opened under chloroform revealing about 1 foot of the lower ileum completely blocked by a knotted mass of large round worms. That

portion of the bowels was œdematous, swollen, and with localized peritonitis. An incision was made into healthy bowel above the obstruction, and ninety-two round worms extracted. The incision in the intestines was closed and the abdomen washed out—a drainage tube being left in for a few days. Before leaving hospital, he was treated with santonin and passed eight more ascarides.

Rupture of Spleen—Laparotomy—Tamponage.—A youth, aged 16 years, was admitted with the history of having fallen off a coconut tree thirty-six hours previously. He was intensely anæmic, had a fast feeble pulse and evidence of serious intra-abdominal injury. Ether was administered, and, on opening his abdomen, it was found to be full of blood. The spleen was at once examined and found to have sustained two large rents, one at the upper inner margin and one at the posterior margin. The patient's condition was so bad that removal of the spleen was deemed inadmissible. A large sterilized cloth 3 ft. long was used as a tampon and brought out through an incision made below the cortal margin. The abdomen was washed out and closed. His pulse after the operation was 150 and temperature 102. He gradually improved, and five days later the plug was removed and replaced by two drainage tubes. The wound healed by granulation and he was eventually discharged well.

Penetrating Wound into the Abdominal Cavity via Rectum—Laparotomy—Suturing and Drainage.—A young girl, aged 17 years, gave the history that she was standing on the trunk of a large fallen tree with projecting branches, and fell, becoming impaled *via* the anus by one of the broken boughs where she had to remain until assistance was obtained. She exhibited symptoms of commencing peritonitis with a very rapid pulse. Sigmoidoscopic examination revealed a penetrating wound extending upwards into the abdominal cavity. Her abdomen was then opened under chloroform and she was found to have a rent, about 2 ins. wide, opening into the abdomen through the fold of the right broad ligament. There was commencing general peritonitis but no injury to viscera. The rent was closed and a drain left in down to the pouch of Douglas. The rectal end of the wound was also drained. Her symptoms subsided and she left hospital with the wounds healed.

Strangulated Ovary in Hernial Sac—Herniotomy—Radical Cure.—The patient was admitted with vomiting and a tender swelling in the position of a left inguinal hernia. Under novocain anaesthesia the hernia was cut down upon and the sac found to contain an ovary which was very dark in colour acutely congested, but still viable. The ovary was reduced, after enlarging the rings, the sac ligatured and excised, canal repaired. She made a rapid recovery.

Strangulated Umbilical Hernia—Herniotomy—Radical Cure.—This comparatively infrequent condition occurred in a very stout elderly woman admitted with typical symptoms. With novocain and light chloroform anaesthesia, the sac was exposed and found to contain a mass of adherent omentum with 2 ins. of strangulated jejunum in its centre. The gut was reduced, the peritoneal sac excised and the

various layers of the abdominal wall closed by separate sutures—Recovery resulting.

Compound Depressed Fractures of Skull—1—Trepanage and Elevation of Bone—Recovery.—An East Indian boy, aged 6 years, was admitted with the history of having received a kick on the head from a mule. He had a large compound depressed fracture of the skull in the right parietal frontal region. Under chloroform, the wound was enlarged, the bone trephined, the depressed portion elevated, and the piece of bone removed by the trephine replaced. The wound healed by first intention.

2—Trepanage and Removal of Depressed Fragments—Recovery.—An East Indian, aged 30 years, was admitted to hospital with an extensive compound comminuted depressed fracture of the skull in the left occipital region above the superior curved line, the result of a blow with an axe. A piece of bone about $\frac{3}{4}$ in. square was driven deeply into brain, the longitudinal sinus was injured and brain matter was issuing from the wound. The skull was trephined, the depressed fragments elevated were so badly splintered that they had to be removed. The trephined piece was replaced and the wound eventually healed well.

3—Removal of Depressed Fragments—Recovery.—A man, aged 40 years, was admitted with a very comminuted depressed fracture of the left temporal bone over the ear, the result of a blow with head of a stick. The pieces of bone were removed exposing the brain surface and injuring the inferior petrosal sinus. The inner ear escaped injury. This wound was slow in healing.

The good results obtained in these three cases were probably largely contributed to by eusol, which is the antiseptic now in general use at this institution.

Mastoid Disease.—The radical operation was performed in four cases for mastoid disease associated with persistent aural discharge. One case is worth recording. A male East Indian was admitted with irregular pyrexia, left facial paralysis, and signs of acute mastoid disease. The simple operation was performed with only temporary relief. The pyrexia recurred with severe persistent headache and symptoms of commencing meningitis. The radical operation (Schwartz) was then performed with immediate subsidence of the acute symptoms and ultimate recovery.

Spinal Anaesthesia—Stovaine.—This method was used in three cases for amputation of the leg where a general anaesthesia was contra-indicated and acted perfectly.

It was also utilized in a fourth case where an old man of 70 years, with aortic disease of the heart was transferred from a district hospital with acute intestinal obstruction of four days duration and which failed to react to purgatives and enemata. Stovaine was injected into the spinal cord and a phenomenon (which has recently been described as among the advantages of its use and ascribed to the abolition of the inhibitory reflexes to the intestines through the splanchnic nerves) occurred, viz.: an immediate and complete action of the bowels followed by relief of all symptoms—a method of demonstrating that the obstruction was either fecal or due to "ileus."

Local Anæsthesia—Novocain.—Among many cases in which this drug was successfully utilized during the year are the following:—

(1) Two cases of amputation of the leg below the knee, a hypodermic injection was made over the site of the bifurcation of the sciatic nerve, which was cut down upon and an injection made around the nerve trunks, a line of infiltration was also made over the course of the long saphenous nerve below the knee on the inner side. Complete anæsthesia was obtained.

(2) An emaciated man was admitted with a carcinomatous growth involving and constricting the gullet at the level of the bifurcation of the trachea. He suffered great pain in attempting to swallow and was dying of starvation. Novocain infiltration was made into the abdominal wall and through the left rectus a gastrotomy was performed, the stomach being brought up and sutured to the abdominal incision and opened. He only complained when the stomach was being explored. He was fed through the opening and obtained great relief. An extension of the cancerous growth caused his death many weeks later.

(3) An ill nourished woman showed symptoms of general peritonitis and acute intestinal obstruction. Her condition was so bad that the use of a general anæsthetic could not be attempted. Novocain infiltration of the abdominal wall was utilized and her abdomen opened. The obstruction was caused by extensive adhesions from tubercular disease of the peritoneum and intestines. An artificial anus was instituted and she obtained immediate relief of all her urgent symptoms.

(4) A cyst was also successfully removed from within the thyroid gland by means of novocain infiltration.

The following are the fatal cases, to which, in every instance, operative treatment alone offered them any possibility of surviving:—

Ruptured Pyosalpinx—General Peritonitis.—This woman was admitted with general peritonitis and feeble pulse of 160. She never improved sufficiently, in spite of saline infusion, to allow of a general anæsthetic being administered. Free incision and drainage of the abdominal cavity with novocain anæsthetic was therefore resorted to, but with only temporary improvement.

Perforated Duodenal Ulcer—General Peritonitis.—This patient was admitted with general peritonitis and in a very feeble condition, with history pointing to a perforation of a duodenal ulcer two days previously. In spite of his apparently hopeless condition, laparotomy under ether anæsthesia was performed. The perforation was rapidly closed and drainage resorted to but without avail.

Gangrenous Appendicitis (Perforated) Empyema.—Appendicectomy with drainage was performed in this case who was admitted with symptoms of spreading peritonitis and quickened pulse. On opening the abdomen the appendix was found to be gangrenous, containing a large concretion, and had ruptured. The appendix was removed and abdomen drained. The abdominal symptoms subsided and the patient was progressing satisfactorily when, twelve days later, he developed signs of a right sided empyema. Under local anæsthesia, the thorax was opened, and the

pleural cavity drained of purulent fluid having the typical characteristics of a coli infection to which the patient eventually succumbed.

Suppurative Appendicitis with General Peritonitis.—A girl, aged 7 years, was admitted with general peritonitis. Under ether anæsthesia, the abdomen was opened and drained by tubes leading down to the appendix area and pelvis. Her condition precluded any attempt to search extensively for and isolating the appendix. She succumbed from toxæmia. Post-mortem examination demonstrated that the appendix had almost completely sloughed away.

Acute Intestinal Obstruction—Meckel's Diverticulum.—This patient would, in all probability, have recovered had no difficulty been encountered in obtaining his consent to an operation. On admission there was definite evidence of complete intestinal obstruction, but all persuasion failed in obtaining his permission to have an operation performed, until thirty hours later when his condition was very much worse. Laparotomy revealed sero-sanguineous fluid in the abdominal cavity with early general peritonitis. There were two complete constrictions of the small gut caused by a band connected with a Meckel's diverticulum. These were relieved by division, but the patient only survived ten hours.

Compound Fractures of Skull (multiple).—An elderly woman was admitted to this hospital three weeks after her injury. She already had advanced septic infection of her membranes with sloughing of brain tissue and extensive necrosis of large pieces of the bones of the skull; the result of multiple previous incisions inflicted by a cutlass and penetrating deeply into the brain in many places. There was one sinus through which a probe could be passed into the left lateral ventricle. The removal of the extensive areas of necrosis which had become free was all that could be done.

Volvulus.—An East Indian was admitted in a collapsed state with symptoms of acute and complete intestinal obstruction of some days' duration. By means of saline infusions he was sufficiently improved to render it possible to open his abdomen which revealed a hopeless condition. The sigmoid colon was gangrenous the result of a large volvulus. The twist was rectified and colotomy performed, but his condition never improved.

Perforation of Enteric Ulcer—Peritonitis.—A moderately nourished woman was admitted with a virulent infection of enteric fever. She developed signs of a perforation of the intestine. Her condition was so bad that novocain anæsthesia was resorted to, the abdomen opened, and the perforation of the intestine closed. Several other enteric ulcers were noticed to be on the verge of perforating also.

E. A. TURPIN,
Resident Surgeon.

LUNATIC ASYLUM,
ST. ANN'S ASYLUM, TRINIDAD.

The number of admissions was the highest since 1904 and included fifteen re-admissions.

In view of the importance of early treatment it is to be regretted that of those suffering from mental

disorder for the first time less than half the number came under asylum treatment within three months of the attack.

Mania showed a great preponderance and was of a more protracted type than usual. Insane or neurotic heredity was ascertainable or presumable in nearly 50 per cent. of the admissions, alcohol and mental stress being the chief exciting causes.

The percentage of recoveries on the admissions during the year under review was somewhat below the average of recent years due to the larger number of admissions over 60 years of age, an adverse circumstance which was reflected also in the higher death rate.

Tuberculosis, chiefly pulmonary, caused over 30 per cent. and dysentery about 20 per cent. of the deaths. One death, due to fracture of the skull produced by a fall, formed the subject of inquest.

The general health of the asylum was fair there being very few cases of infectious disease. Dysentery however appeared with its usual frequency between June and October and was associated with a high death rate.

GEO. A. VINCENT,
Medical Superintendent.

LEPER ASYLUM.

In spite of the increased accommodation the wards were quickly filled, and at present there are three or four over the prescribed number.

Some of the patients devote their attention to agricultural pursuits and a good deal of provisions are supplied to the institution and thus the Government effected a saving of nearly eight hundred dollars—half of the contract price paid for provisions.

The water supply is ample both in quality and quantity. The incinerator works well, and the sanitary arrangements are satisfactory.

The dietary is good and nutritious.

The general conduct of the inmates has been good, and although there have been a number of cases of imprisonment, the same men have been nearly always committed again and again for the same offence.

Many of the inmates are employed in works of various sorts, such as gardening, masonry, carpentry, &c. An attempt is being made to introduce other manual industries, such as shoe making which would have the double advantage of affording occupation to the inmates and of economy in providing outfits. Tincture of mangrove is made at the institution, is largely used by the patients and with satisfactory results in many cases. It does not effect a cure—it keeps the disease in check. Chaulmoogra internally also renders great service in the treatment of leprosy.

ST. AUGUSTINE YAWS HOSPITAL.

The general accommodation provided for the patients is unsatisfactory. Most of the cases have to be on the floor, and there is no provision for isolating cases of measles, chicken pox, typhoid fever and dysentery which occasionally occur.

One thousand one hundred and nine patients were admitted during the year 1916, and 10,393 have been admitted since the opening of the hospital in 1901. There were nine deaths from the following causes, two worms, one chronic ulcer and diarrhoea, one septicæmia, one anæmia and Bright's disease, one anæmia and worms, one diarrhoea, one tertiary syphilis, one gastro-enteritis. Three of these were not injected. Manzanilla still sends the largest number of cases. This district, together with Indian Walk, Guaracara, and St. Joseph (amalgamated) sent 526 cases or more than half the number of admissions. Last year, Manzanilla, Indian Walk, Guaracara, and Couva sent more than half the number of admissions; but the number of cases sent from Couva during this year has decreased, and the number from St. Joseph has increased greatly.

The average stay of patients in hospital is sixty-two days; during the nine months ended December, 1916, the average stay was forty-two days.

Galyi, kharsivan, diarsenol and arseno-billon injections have been used on the cases. Galyi, which does not keep in this climate, has not proved to be satisfactory.

Diarsenol was injected intramuscularly in alkaline solution. The results of the use are as follows:—

Injected	86
Cured with one injection	77
" " two injections	9
Recurrent cases	2
(One treated with 606 previously.)	

Kharsivan.—At first oily suspension, but later alkaline solutions were used for intramuscular injections. The results are as follows:—

Number injected to 31st December, 1916 ..	1,071
" " with one injection	990
" " with two injections	75
" " with three injections	6
" cured to 31st December, 1916 ..	1,039
" under treatment	42
Recurrent cases (one treated with 606) ..	17

Arseno-billon was used from 21st November up to 31st December, 1916. Eighty-seven cases were injected, 43 cured and 44 under treatment.

One thousand two hundred and forty-four injections were done during the year. The total number of injections done up to 31st December is 5,894—of this number 5,197 were treated with one injection, 654 with two injections, 40 with three injections and 3 with four injections.

One hundred cases were re-admitted to hospital during the year. Twenty-one were never treated with 606, the majority were treated with Castellani's iodide mixture.

Of the remaining 79 cases, 62 were treated with the original salvarsan of Ehrlich; 16 with kharsivan, and 1 with diarsenol. Out of 4,650 cases treated with the original salvarsan, 235 were re-admitted. The percentage of recurrences is 5 per cent.

J. ALDRIC PEREZ,
District Medical Officer.

Colonial Medical Reports.—No. 89.—Trinidad and Tobago
(continued).

ANNUAL REPORT FOR 1916, BY THE SURGEON-GENERAL.

PART II.—PUBLIC HEALTH.

Nearly all the Medical Officers report satisfactorily on the health conditions of their districts. There was no outbreak of epidemic disease in any part of the colony.

Diarrhœa and Enteritis.—This group of intestinal diseases was the cause of the highest mortality, viz : 808 deaths with a rate of 2.19 per 1,000 living, and was mainly responsible for the high death rate among infants under 1 year.

Malaria.—Malaria produced the second highest mortality in the colony, viz : 639 deaths and a rate of 1.74 per 1,000 of population, and is a serious problem in certain districts. In the hospitals there were 663 cases of malaria treated during the year with 32 deaths.

The prevention of this disease will, it is hoped, be taken in hand with prospects of success as soon as the Anopheles Surveys of the entire colony shall have been completed.

Tuberculosis.—The various forms of this disease, particularly pulmonary tuberculosis, were as usual very prevalent—their prevalence being greatest in Port-of-Spain with 242 deaths and a rate of 3.66 per 1,000, out of a total of 568 deaths and a rate of 1.54 per 1,000 in the entire colony. Dr. Grell, District Medical Officer, Toco, reports an increase in the prevalence of phthisis in his district, the infection being traced in a few instances to Port-of-Spain.

Dr. Howatson, District Medical Officer, Bocas, also refers to the unusual prevalence of pulmonary tuberculosis at Chacachacare.

With the advent of compulsory notification of pulmonary tuberculosis it is hoped that measures directed against the spread of infection in the community may be successfully undertaken.

Enteric.—This disease continues to be unduly prevalent throughout the colony. The appended tables show the number of cases notified and the deaths from the disease.

Ankylostomiasis.—The disease was very prevalent during the year, especially in districts such as Naparima and Couva, in which are situated the larger sugar estates with their large East Indian population.

South Naparima reported 497 cases with only 3 deaths. Couva reported 489 cases treated and 27 deaths.

In these two districts 986 cases were observed out of a total of 1,737 cases treated in the whole colony—outside of the Colonial Hospitals Port-of-Spain and San Fernando and the district hospitals.

The number of deaths recorded from ankylostomiasis in the whole colony was 251.

The international Health Commission carried out a campaign against ankylostomiasis in Tunapuna, Arouca, Dabadie, Lopinot, Arima.

Regular monthly reports were submitted by the Medical Officer in charge, and they displayed a vast amount of very useful work in the districts dealt with. Effects of the good work will be maintained only if and as long as sanitary authorities enforce

the provisions of the law regarding privy accommodation on premises in rural districts.

Leprosy.—The number of patients at the Asylum at the end of 1916 was 427—number segregated 17. This would bring the total of the known cases to 444, but as there is reason to believe that there are many other cases about the island still unaccounted for, I have placed the total number at 500 cases which would give a percentage at 1.35 per 1,000. More stringent measures are now being taken by the Government, and those who cannot be isolated are sent to the Asylum.

Since the discovery of *Bacillus Lepre* by Hansen this has given more precision to our ideas on the subjects of heredity and contagion. Dr. Tulloch who takes a great deal of interest in the subject reported that a considerable number of lepers were found within a very small area in the Chaguanas district. No doubt one or two lepers settled in the place and contamination gradually took place. Although leprosy is found all over the island, it is less common in the southern district.

F. A. DE VERTEUIL,
Acting Surgeon-General.

HEALTH REPORT, COLONY OF TRINIDAD AND TOBAGO,
FOR THE YEAR 1916.

The average rainfall for the year, based on records from 105 stations, was 74.22 inches.

The population was estimated by the Registrar-General to be 368,231 at the middle of the year.

The total number of deaths registered was 7,526.

Tuberculosis, which in the towns is the cause of the greatest number of deaths, ranks third in the statistics of the entire colony—it being, as is well known, a disease *par excellence* of crowded centres of population, and the incidence of it in country districts in which the people live an open air life, being lower than that of diarrhœa and enteritis and malaria.

The deaths from all causes in 1916 numbered 7,526, giving a rate of 20.44 per 1,000.

Outside of Port-of-Spain there occurred four deaths from diphtheria. The four deaths were all registered during the third quarter of the year.

The method of spraying cesspits with crude oil, which has been attended with such good results in Port-of-Spain, has been adopted in San Fernando, Couva and Tacarigua. It is hoped that the introduction of this measure generally will not now be long delayed with the advent of the new era in the sanitary affairs in the colony.

On June 10, 1916, mosquito breeding pools were observed in the bed of the St. Ann's river near the point at which the bridge leading to Coblentz Avenue spans the river. Larvæ of *Anopheles albipes* and of *Culicines* were found in abundance. Prompt measures were taken, petroleol being immediately carried out with subsequent drainage and filling in of depressions.

It is hoped to resume the Anopheles survey at an early date and to complete it before the end of the year.

C. F. LASSALLE,
Deputy Surgeon-General,
Medical Inspector of Health.

BACTERIOLOGICAL LABORATORY.

A total of 1,843 specimens (exclusive of rats) examined represents a monthly average of about 153 specimens. The following are short notes concerning the more important specimens examined:—

Blood.—1,074 specimens were examined mainly for malaria and enteric, and a few for filaria.

Malaria.—595 of the above were films examined for malaria, 24 benign tertian cases were returned, and 90 positive sub-tertian. There were 481 films examined with negative results.

Enteric.—465 specimens were examined for enteric fever. Of them 268 gave a positive widal reaction and 197 negative.

409 specimens of sputum were examined for tubercle bacilli, 167 were positive and 242 negative.

Thirty-one specimens of urine were examined for nature of deposit, diazo-reaction, &c.

Thirty-one throat-swabs were examined for diphtheria both in smears and cultures. Of them eleven were positive and twenty negative as regards the presence of Klebs-Löffler bacilli.

Ninety-nine specimens of faeces were examined, of which eighteen were found to contain amebae, twenty-eight ova of ankylostoma, one *Ascaris lumbricoides*, and three whip worms. Fifty specimens were negative.

Of 68 tumours of which paraffin sections were made and examined, forty-three were found to be malignant, one a gumma, one a dentigerous cyst, one fibrous epulis, and the others were non-malignant.

Thirteen ox spleens gave positive result in smears and cultures for anthrax; six were negative.

Regular analyses of the supply of the town water were carried out, two samples being examined each month from different parts of the supply, either from reservoirs or from public standpipes or private service taps. The results show the water which is generally consumed in Port-of-Spain to be of potable quality.

In a sample taken from Ariapita stream on January 26, 1916, a fair number of lactose fermenting organisms were found, which gave the usual reactions organisms of the type of *B. coli*. The use of the water from this source was discontinued on the same day (February 7, 1916), on which my report was presented. In May another sample was examined and showed no organic impurity. The quality of the water is therefore very variable.

Examination of kala-azar fluid obtained by puncture of the liver and of enlarged spleens obtained post-mortem for Leishman-Donovan bodies gave negative results.

C. F. LASSALLE,
Acting Government Bacteriologist.

HEALTH REPORT—CITY OF PORT-OF-SPAIN, FOR 1916. METEOROLOGICAL STATISTICS.

The following figures are taken from records of the Department of Agriculture, based on observations taken at the St. Clair Experimental Station during the calendar year 1916:—

Meteorological Record.

Barometer mean daily register	..	29.985 inches
Thermometer—mean maximum	..	83.6 "
" minimum	..	68.4 "
Mean annual temperature	..	76.0 "
Mean annual relative humidity	..	79.0 "
Rainfall	..	69.73 "

Rainfall

January	..	..	..	..	5.29	..
February	..	..	..	..	1.35	..
March	..	..	..	..	1.57	..
April	..	..	..	..	1.91	..
May	..	..	..	..	0.94	..
June	..	..	..	..	10.30	..
July	..	..	..	..	8.04	..
August	..	..	..	..	11.57	..
September	..	..	..	..	10.78	..
October	..	..	..	..	6.68	..
November	..	..	..	..	9.32	..
December	..	..	..	..	1.98	..
					69.73	..

Direction of Wind.

During the year the prevailing winds were from the following directions of the compass, in order of number of observations:—

N.E.	..	..	..	..	332 observations.
S.E.	..	..	..	..	180 "
E.	..	..	..	..	97 "
N.	..	..	..	..	75 "
N.W.	..	..	..	..	30 "
S.W.	..	..	..	..	23 "
S.	..	..	..	..	19 "
W.	..	..	..	..	2 "

As in previous years the prevailing winds were Easterly—N.E. predominating.

Population.—This was estimated by the Registrar-General to be 66,014 at the middle of the year 1916. The density of population, viz., 49.3 persons per acre over the total area of the city, is slightly higher than that of the previous period of nine months, when it was 48 persons per acre.

The number of births registered was 1,693. Of these, 874 were males, and 819 females, the proportion being approximately ninety-three girls to every 100 boys. The birth-rate was 25.64 per 1,000 of population.

In my report for the year 1914-15 reference was made to the fact that the birth-rate of Port-of-Spain had gradually declined from 42.25 per 1,000 in 1905-1906 to 27.28 in 1914-1915. During the year 1916 the birth-rate was 25.64, i.e., very slightly higher than during the period April 1 to December 31, 1915, when it was 25.47 per 1,000. The still-births during the year numbered 105, that is 6.2 per cent. of the total births. This percentage is 1.2 less than that of the previous nine months period, and 2.27 less than that of the year 1914-1915. This satisfactory reduction is undoubtedly in some measure due to the good work of the district nurse-midwives.

The total number of deaths from all causes registered in the city during the year was 1,739. There were therefore 46 more deaths than births.

The birth-rate during the year 1916 was lower than the death-rate by 0.68 per 1,000, a slight improve-

ment on the condition during the previous nine months period.

Port-of-Spain being a town in which there is a large Central Institution, i.e., the Colonial Hospital, to which persons, the majority of whom are seriously ill, from places outside its boundaries are admitted in fairly large numbers, it is obvious that the crude death-rate, viz., 26.34 per mille, calculated from the total number of deaths (1,739) does not represent the actual death-rate among residents in the town. It is therefore not a true index of the actual rate of mortality among the inhabitants. By deducting from the total number of deaths registered the number of deaths in the Colonial Hospital (viz., 146), of persons from out districts i.e., non-residents, one more nearly approaches accuracy and obtains the following:—

The total number of deaths	1,739
The total number of deaths of non-residents in the Colonial Hospital	146
<hr/>	
The total number of deaths of residents	1,593
Death-rate of residents or "Recorded	
Death-rate"	24.13

The natural increase is therefore 1,681 births less 1,593 = 88 instead of minus 46.

In order to be nearer to absolute accuracy one should also add to the number of deaths the number of residents of Port-of-Spain who die outside the limits of the town, and whose deaths are registered in districts other than Port-of-Spain. Further, a refinement might properly be made use of by subtracting from the estimated population on which the rates are calculated, the average number of persons from out-districts who are temporarily resident at the Colonial Hospital at any time during the year. These two considerations would affect the recorded death-rate to some slight extent.

Infantile Mortality.—The number of deaths of children under one year of age was 376, and the infantile mortality rate 222 per 1,000 births registered during the year. Diarrhoeal diseases were, as usual, responsible for by far the greatest number of deaths. In my last annual report on health conditions in Port-of-Spain reference was made to the questions of the formation of a Baby Saving League in this city such as exists in British Guiana and of the provision of milk depots. A short sketch of the history of the latter was given. Up to the present, however, there has been no attempt to introduce either of these two useful life-saving measures.

Evidently, the public spirited philanthropists of the community are wholly engrossed in very deserving work for the Red Cross and the numerous other war funds. One may here venture to express the fervent hope that on the termination of the war a part at least of the splendid and extraordinary enthusiasm with which the voluntary workers for the war funds are imbued, will be devoted to infant and child welfare.

In all countries it is recognized that the preservation of infant life is one of the most important of all hygienic measures. Particularly should this be so in a colony like Trinidad and Tobago, in which a

declining birth-rate has for some years been a prominent and alarming feature of our vital statistics.

242 deaths resulted from tuberculosis during the year, giving a death rate of 3.66 per 1,000 of population. The number of cases of tuberculosis notified during the year was 228. Tuberculosis as hitherto was responsible for the highest number of deaths, diarrhoea and enteritis being next with 205 deaths and a death-rate of 3.10 per 1,000. Precautions against the spread of the disease consisted in the disinfection of premises—including inner walls of rooms, bedding and clothing—after the death or removal of cases, as well as advice to relatives and friends.

The absence of Compulsory Notification of Tuberculosis is a very serious drawback to any attempt at applying preventive measures with success.

From the figures given above it is obvious that very many cases, foci from which the disease may spread, are not reported and therefore no action with regard to them can possibly be taken by the Sanitary Department.

Only 228 cases were notified, whereas there were 242 deaths registered.

There was a total of 163 cases of enteric fever notified, i.e., an average of 13 cases per month compared with 143 and a monthly average of 14 cases in the previous nine months.

Thirty-three cases occurred in the sewered and 130 in the non-sewered parts of the town.

There were 38 deaths, i.e., the case mortality was 23.3 per cent.

This fatality is not accurate, for though all deaths were brought to notice, all cases were not notified. Henceforth on account of the Compulsory Notification of enteric under the new Public Health Ordinance, more reliable statistics will be obtainable.

As in previous years, in all cases of enteric fever, the premises, including rooms, bedding, privies, &c., were disinfected as soon as possible after the receipt of the notification of cases.

In my last annual report I referred to the protective inoculation against typhoid fever as being of proved utility and one that ought to be adopted here. In May, 1916, I submitted an outline of a scheme for its adoption in certain infected districts of the Colony, including Port-of-Spain.

In my report for the previous nine months' period I discussed and arrived at the conclusion that the milk supply, dies, carrier cases, and direct infection from the sick to the healthy all contributed in some measure to conditions favouring the spread of the disease in this city.

Milk Supply.—Any danger should be reduced to a minimum so soon as the effect of the introduction of bye-laws under the new Public Health Ordinance becomes manifest.

The common house-fly is a danger which is and will continue to be directly proportional to the efficiency with which house refuse and manure are collected and disposed of by the people.

The danger is not eliminated as some appear to

believe, the moment a covered metal dustbin is provided. In many instances efforts are not taken to keep the spots around the dustbins clean, rubbish being scattered about the entrances to premises which are never thoroughly cleaned nor disinfected.

Twenty-five cases of malaria occurred in the town during the year and were inquired into.

In nearly every case infection was traced to some part of the country, in two cases to parts of Venezuela, and was not acquired in Port-of-Spain.

One case occurred within the Woodbrook District near the insanitary portion and not far from one of the anopheles breeding grounds now being dealt with.

Inspection around and in the neighbourhood of the Port-of-Spain residences in each case revealed no conditions favouring the breeding places of anopheles mosquitoes.

At the Malarial Exhibits at the Agricultural and Industrial Exhibition, held at the Prince's Building on March 17, 18, and 19, 1916, a stall was prepared by this department, and interesting exhibits of mosquitoes in all stages, &c., were shown. The exhibits as usual attracted large numbers of visitors who took a very keen interest in the specimens and the demonstrations. Instructive leaflets were freely distributed among visitors.

Disinfection of Premises for Vermin.—This was carried out by spraying the inner walls, floor and bedding with a mixture of cyllin, soft soap and kerosene, in 979 cases mostly licensed common lodging houses known as coolie hotels.

These coolie hotels, which numbered 28 on December, 1916, are under the regular supervision of the sanitary inspectors.

Rats and Mice.—The sanitary department was vigilant in the care of the suitable screening of grain and other rat food in retail shops.

In some districts a marked diminution of the number of rats observed has been recorded by the assistant sanitary inspectors.

The total number of rats and mice caught during the year amounted to 12,869 rats and 3,124 mice.

The six rat gangs were maintained and 6,132 rats were brought in by them out of the total of 11,470 caught during the year.

MOSQUITO PREVENTION.

Anopheles.—The two known anopheles breeding grounds within the city boundaries, viz., near the south-eastern corner of the town and the Woodbrook Savannah, received attention during the year.

The Woodbrook low-lying lands were improved in keeping with a definite scheme of draining and filling in depressions. The improvement, which undoubtedly is commensurate with the heavy cost is already considerable though the work has not been completed.

Stegomyia and Culex.—The department was as usual active in their attention to the usual well-known breeding places throughout the city.

There are many valley gutters on large buildings which are difficult to deal with and are therefore occasionally overlooked owing to their being inaccessible to the employés of the department with the apparatus at their disposal.

One very interesting case should be referred to which should be an eye-opener to many persons in the community who openly express the belief that the gutters attached to the roofs of houses are negligible as mosquito breeding places.

The valley gutters of certain large premises in the centre of the town which had previously, owing to difficulty of access, not been cleaned, were inspected and cleaned by the department's ladder gang. A large amount of stagnant water and dirt, &c., were removed in the process of cleaning, five cement barrels of stuff being removed from valley gutters.

In the St. Clair-Newtown District the prevalence of *Stegomyia* was, during the latter part of the year, unusually great, and in view of the danger to the public health, steps to eradicate the breeding places were taken, with a good measure of success.

It is of interest from an entomological point of view that the larvæ of *Megarhinus trinidadensis* and *Megarhinus superbus*, known as sylvan species, were found in collections of water on two premises in the Newtown district, viz.: 94, Pieton, and 113, Woodford Streets.

H. L. CLARE,
Surgeon-General.

Colonial Medical Reports.—No. 90.—Queensland.

ANNUAL REPORT OF THE COMMISSIONER OF PUBLIC HEALTH TO JUNE 30, 1917.

By J. I. MOORE.

STATISTICAL.

THE estimated mean population for 1916 was 677,630, as against 687,010 for 1915, which decrease is partly due to the large numbers of our male population who have left the State on war duty.

The crude birth-rate (births per 1,000 of the mean population) for 1916 amounted to 27.91.

The crude death-rate (deaths per 1,000 of mean population) for 1916 was 11.09. This compares favourably with the other Australian States, and is one of the lowest death-rates in the world.

The infantile mortality rate (deaths under one year per 1,000 born) for 1916 was 70.4, an increase on the figures furnished for the previous year.

COMMUNICABLE DISEASES.

The following infectious diseases were notified during the fiscal year, as compared with those for 1915-16:—

	Brisbane Metro- politan Area.		Outside Areas.	
	1916-1917.	1915-1916.	1916-1917.	1915-1916.
Typhoid ...	146	283	515	1,447
Diphtheria ...	514	500	1,096	1,066
Phthisis ...	296	203	173	262
Scarlet Fever ...	246	49	310	264
Puerperal Fever ...	12	10	17	18
Erysipelas ...	68	59	66	45
Ankylostomiasis ...	1	1	95	21
Infantile Paralysis ...	24	4	13	23
Cerebro-spinal Meningitis ...	58	97	67	20
Chickenpox ...	91	215	407	329
Malaria ...	2	32	211	47
Membranous Croup ...	—	—	4	1
Relapsing Fever ...	—	—	—	1
Dysentery ...	—	—	—	3
Total ...	1,458	1,453	2,974	3,547

The above statistical figures afford a satisfactory record, showing a marked decrease in the aggregate number of cases of infectious diseases during the year.

On April 27 last, for administrative purposes, the following diseases were removed from the category of "infectious" and declared to be "notifiable" within the meaning of "The Health Acts, 1900 to 1917": Pulmonary tuberculosis, cerebro-spinal meningitis, anterior poliomyelitis, ankylostomiasis, and malaria.

Joint Boards for the purpose of dealing collectively for hospital treatment of infectious diseases have in some instances established infectious diseases hospitals, thus relieving the accommodation at the local general hospitals.

Cases of malaria continue to be received, prin-

cipally from the northern centres of the State. The valued services of the Director of the Tropical Institute of Medicine, Townsville, are availed of by medical practitioners who meet with patients suffering from this disease. Unfortunately an increase in the number of cases is shown, but until the matter of mosquito destruction is wholeheartedly adopted by local authorities the spread of malaria may naturally be expected. Although the Mosquito Regulations have been in existence for some time, it is difficult to make Councils realize their duty in carrying out their provisions, expense being the principal deterrent to their enforcing same. Until water tanks, water holes, &c., are screened and treated the malarial mosquito will continue to claim victims, and not only has malaria to be considered but yellow fever also, and should the latter be introduced it will prove a dire calamity to this State. The precept to be deducted is: "Remember, no water, no mosquitoes, and no mosquitoes, no malaria."

Typhoid Fever.

A marked decrease in the number of cases of typhoid fever reported for the fiscal year is shown in the foregoing table. This satisfactory result is mainly due to improved sanitary conditions, as well as to the adoption of anti-typhoid inoculation. The latter prophylaxis, I am glad to relate, is appealing to the community, who realize from practical experience that this is the only efficacious safeguard against the disease.

During the year I made an extensive tour of all the main centres where typhoid has occurred for years past, and interviewed the local authorities when matters of improved sanitary requirements were discussed. It was gratifying to find that many Councils, recognizing the importance of the part played by the fly in spreading typhoid, had taken steps to follow the advice of this department in making the local sanitary conveniences fly-proof, thus eliminating the main source of danger as regards outbreaks.

The compulsory payment to public hospitals for the treatment of typhoid patients, as provided for by agreements prepared under the Health Acts, has been a strong incentive to take steps to prevent cases occurring.

In addition the requirements of the new Food and Drug Regulations, as regards fly-proofing of kitchens in hotels, boarding-houses, restaurants, &c., whereat food is prepared for sale, have materially assisted in combating the fly trouble.

The old cesspit is fast disappearing, and where still existent is rendered practically safe by being securely fly-proofed.

Septic tanks, where no sewerage system is in vogue, are becoming much in evidence in larger towns, especially at hotels, where in the past carriers were a constant source of danger, the nomad oftentimes unknowingly being the cause of an outbreak, originating at one of these public places.

The provisions of the Health Acts as regard "carriers" being placed under treatment have been availed of in a few instances, and carriers were ordered to hospitals for bacteriological investigation, and the spread of typhoid has been controlled in this way until the patients are certified as being free of the typhoid bacillus.

Diphtheria.

The total number of cases of diphtheria notified for the whole State amounted to 1,610, as against 1,566 for the previous year, thus showing a small increase of some forty-four cases.

The method adopted in dealing with outbreaks of the disease under "The Diphtheria Regulations" continued to prove satisfactory. As soon as a case occurred the medical attendant immediately notified this department as well as the local authority, which in turn notified the State school teacher, when the pupil is debarred from attending school until certified to be free of the disease. Carriers are also kept under close supervision, being likewise kept away from school until three successive negative swabs had been secured. The residence at which a case occurs is placarded to the effect that the inhabitants are under quarantine. This course proves a deterrent against visitors as well as against other children being allowed admittance. Should an outbreak occur at a public school the whole of the pupils are swabbed and the school premises receive a thorough disinfection, including slates and other school implements. This course generally meets requirements and seldom necessitates the school being closed, as it has been found that when a school is closed the pupils congregate together and contagion is more widely spread.

The Department of Public Instruction, as in the past, freely utilizes the services of this department in dealing with all such outbreaks, and it is pleasing to record that our joint efforts have proved in every way satisfactory without friction being occasioned between the respective staffs.

Large numbers of swabs are obtained and forwarded to this department's laboratory, when the results are at once furnished to the Education Department as well as to the local authority in whose area cases occur.

The pupils attending fourteen schools were swabbed, and the following were the results:—

Number of pupils swabbed, 3,256. Number of carriers, 324.

The Diphtheria Regulations are in force at the principal towns of the State from where it is

possible for the swabs to be dispatched for bacteriological examination. The various local authorities are responsible for the carrying out of the provisions of the regulations under their medical officer of health, and in like manner the cost of treatment, isolation, &c., falls on the councils concerned.

Phthisis.

The figures for this year in the metropolitan area of Brisbane show an increase of some ninety-three cases, but this is largely attributed to the fact that some sixty returned soldiers have been notified on their return as suffering from phthisis. On the other hand, it is pleasing to record that for outside areas a substantial decrease is shown, some eighty-nine cases less than the previous year.

The latter figures are most gratifying, seeing that every case reduces proportionately the chances of the spread of the disease to contacts, and from an economic standpoint is of considerable moment to the community at large.

Consumption unfortunately makes its appearance during the most useful period of life, consequently resulting in impaired energy and creating a loss to the wage-earner.

In my previous report I drew attention to the necessity for the establishment of a central bureau through which patients should pass into sanatoriums and be examined after discharge from such institutions. It is practically impossible to combat this disease when cases are not under close medical observation and when home surroundings are not in accordance with hygienic conditions, as mentioned by the medical officer in his report.

I strongly recommend that the Government consider the advisability of providing a home for the housing of patients in the metropolitan area to meet the case of persons residing at hotels, boarding-houses, &c., where proper precautions for the safety of the other members cannot be secured. I may mention that numerous instances have come under my notice where boarding-house keepers have complained that their boarders would leave if a consumptive patient remained and have asked that the case be removed.

Another difficulty that presents itself in respect to fresh cases is that when they become known to their fellow workers there is a general desire to have them removed for fear of contagion.

The question of dealing with the trouble cannot be shelved, as it is only reasonable that relief be afforded both in the interests of the community as well as the patient, and thus I urge the adoption of the scheme outlined above.

At times difficulty has been experienced in preventing the letting of houses at which a case of phthisis has occurred, previous to their being properly disinfected. This is a very serious matter, endangering the health of the unsuspecting incoming tenants, and although the attention of local authorities has been drawn to their powers under the Health Acts to deal with offenders in this respect no prosecutions have followed.

In the metropolitan area the staff nurses have continued their visits of inspection and have left instructions with patients as to the precautions they are required to take. Should any defects at the premises be met with, a sanitary officer of this department then moves in the matter.

Cerebro-spinal Meningitis.

During the year 115 notifications were received for the whole State, as against 117 cases during the previous year. The health officer was therefore deputed to investigate the trouble in the Brisbane area. Specimens obtained from the patients were submitted for examination, and in only six instances was the presence of the cerebro-spinal meningococcus found.

The evidence obtained in the metropolitan area and at outside centres, i.e., Goondiwindi and Dalby, instead of confirming the outbreak as cerebro-spinal meningitis, pointed to its being another form of nervous trouble known as acute anterior poliomyelitis.

Investigation and tests made on monkeys by Dr. Breinl, Director of the Tropical Institute at Townsville, inclined that gentleman after much careful research work to arrive at a similar opinion regarding the matter, but as his investigations had not been completed when I left Townsville I have not full data to hand. However, very few notifications have since been received.

Veneral Diseases.

During the year, as a result of compulsory notification of venereal disease in the metropolitan area, 1,477 cases were reported, comprising 294 primary syphilis, 35 secondary syphilis, and 1,148 gonorrhoea, as compared with 1,946 for 1915, made up as follows: Primary syphilis, 303; secondary syphilis, 47; and gonorrhoea, 1,596.

Two hundred and six of the infected persons described themselves as married, 1,255 as single, 14 as widowers, and 2 as widows: 507 cases were notified from hospitals, 347 by medical practitioners, and 623 by the military authorities.

The ages were as follows: 1 to 2, 2; 2 to 3, 5; 3 to 4, 5; 4 to 5, 5; 5 to 10, 10; 10 to 20, 193; 20 to 25, 495; 25 to 30, 345; 30 to 40, 278; 40 to 50, 106; 50 to 60, 32; 60 and over, 1.

Examined at the Examining Rooms, William Street, 830; new cases, 76; Wassermann tests, 252.

Number of prostitutes admitted to hospital, 116.

The total attendances at the dispensary during the year were: 3,060 males and 316 females.

Details of sources of infection as given on notification: Prostitutes, from houses whose inmates are examined, 132; street prostitutes, 334; other sources, 116; non-prostitutes (details almost always withheld), 895. (Fifty-nine cases were found to have been contracted outside the State.)

The medical officer for enthetic diseases mentions that the class of women who are being examined at the Examining Rooms are only in a small way responsible for the spread of the disease

as compared with those described by patients attending the venereal clinic. I desire to point out that as the law at present stands the class of women referred to cannot be compelled to attend.

In this State additional legislation has been enacted by providing for (1) compulsory notification throughout the State, every person affected to place himself under a medical practitioner within three days of showing evidence of the disease and to continue treatment until certified as cured (special provision has been made for free treatment, so that no excuse can be offered when a delinquent is found); (2) the establishment of clinics in the principal areas of the State; (3) public hospitals to treat free of charge any case of venereal disease; (4) Wassermann tests are to be made without cost at the Department's Laboratory of Microbiology and Pathology for medical practitioners, provided they furnish the required notification; (5) prostitutes to submit themselves for examination at certain centres.

Regulations dealing with the various items provided for in the amended Act are in course of preparation, and when in operation should result in much good to the community at large.

Prescribed forms of notification, on which the patient's name does not appear, as well as pamphlets dealing with the subject in respect to the patient and other phases appertaining thereto, are being issued. Small posters will also be provided for public urinals. Quacks and charlatans are banned under a heavy penalty from treating the disease, so it is hoped, with the assistance of the medical profession and the pharmacists, to carry out the new legislation so that every effort will be made in combating the greatest and worst of our social evils. I must express my appreciation of the kindly co-operation rendered by the Council of the Pharmaceutical Society, who have brought the requirements of the department under the notice of the individual members.

Salvarsan if used in the early stages of syphilis effects a sure cure and also prevents the patient infecting others; unfortunately, salvarsan being made in Germany, supplies since the War are practically unobtainable, but now substitutes for it, arsenobenzol and novarsenobenzol, are obtained from London through the kindly offices of the Agent-General.

The results obtained by using the substitutes are fairly satisfactory, but occasionally a second and further dose has been necessary for success.

The cost of treating syphilis gratuitously must necessarily prove somewhat of a burden, but what is that compared with the cost of having to provide for lunacy, of which 10 per cent. is alleged to be due to syphilis, which disease also increases enormously our expense in connection with the blind? It is the bounden duty of the State to relieve the sufferer as well as to safeguard the unsuspecting future mothers of our population and their innocent and defenceless offspring. If the parent is infected, so will the children be, and for this reason the law prohibits marriages should either of the contracting

parties be infectious. This so-called "health certificate of marriage" is an established fact in some European countries, and in this State provision is made for a medical man to inform either party before marriage as to the condition of the other, if suffering from the disease, and such provision is privileged.

It is pleasing to record that Queensland has led the way in Australia in dealing with the red plague problem, and has taken broad measures in combating it as a preventable disease. Venereal disease is one of the leading questions of the hour, as it has such far-reaching effects on humanity, so that all eyes are focused on the country that is leading in dealing with the question, and expense materially must not stand in the way of relieving the world of such a dire scourge.

There is no doubt that the first and foremost course to be taken is education, and therefore I recommend that a broad educative propaganda on well-defined lines be launched and placed on a sound foundation. Until such a scheme is adopted any public health department is fully justified in carrying out a system of periodic examination of those plying for prostitution.

The examination is made to find the first evidence of disease, and thus bring the unfortunate sufferer under approved and up-to-date treatment and check the spread of this disease.

Many cases of young victims have come under my notice who through innocence were severely caught, and whilst the recommendation of the Royal Commission on Venereal Diseases, 1916, advocates the teaching of what might be called the hygiene of sex during school life, I am somewhat loth in advising whether this should be taught in the home, the school, or by the clergy, as, in my opinion, the environment of the individual should decide the best course to be adopted.

LEPER LAZARET, PEEL ISLAND.

During the year the number of inmates, allowing for deaths, admissions, and two escapes, remains practically the same as the previous twelve months.

The treatment carried out consists of doses of chaulmoogra oil, and this has not been departed from, as the results obtained have proved far more reliable than the use of other preparations which from time to time are mentioned in medical journals, but which when tested in actual practice fail to give satisfaction.

I am pleased to state that two cases now under treatment promise to be fit for discharge at an early date.

The management of the Lazaret continues to prove satisfactory, everything possible being done to lighten the burden of the inmates. It is pleasing to mention that many of the patients display much taste in tending to their respective quarters, which are brightened by flower pots, and of which they are justly proud; others fill in their time in fishing, bathing, and other sports.

The health officer visits the island once a week, when he specially attends to the physical requirements of the inmates; in addition a trained nurse is permanently stationed at the settlement.

Every facility is afforded the relatives visiting the Lazaret, when precautionary measures are taken.

FOOD INSPECTION AND FOOD ADULTERATION.

The administration by the inspectorial staff in connection with foods continues to embrace a wide scope, and in addition further powers have been conferred by the new clauses of the Amendment Act, particularly in respect to poisons.

"The Sale and Use of Poisons Act, 1891" having been repealed, poisons are now controlled by regulations, a draft of which has been prepared and awaits final gazettal.

It is pleasing to mention that dietary goods at present on the market are generally found to be of a genuine and wholesome class.

The imports from overseas are kept under close observation, and when new articles arrive from foreign countries they are submitted to analysis, and should they demand attention the agents are communicated with, when their co-operation is enlisted in securing adjustment.

Many firms have been called upon to amend the labels of certain lines of goods, and in some instances where supplies of labels have been stocked for years ahead the department when possible has met the firms by allowing present stocks to be utilized with the addition of pasters containing the necessary particulars as to weight, contents, &c., required by the regulations. In this respect, owing to war conditions, together with the high cost of paper and labour, the department has done everything possible to in no way harass business people.

Hotels have been inspected, when liquors were tested, and where found to be adulterated submitted for analysis; offenders have been prosecuted, and in no instance have any proceedings failed. These premises have now to supply the public with properly filtered potable water, and, where a filter is installed in their bars, it is of an approved type. In addition steps have been taken to secure proper tumbler washing facilities as well as hygienic conditions for the handling of all drinks by insisting on cleanliness being adopted both in regard to attendants and premises. Kitchens of hotels have similarly been dealt with by rendering all receptacles for food fly-proof as well as the kitchen itself. Urinals have been removed when feasible to more suitable sites, and structural defects in respect to sleeping apartments of the kitchen staff remedied.

Occupiers of bakehouses have been compelled whenever possible to do away with earth floors and replace same with concrete or wood. A copy of the regulations dealing with cleanliness in the preparation of food for human consumption has been issued in each instance for posting on premises in a conspicuous place.

Colonial Medical Reports.—No 90. —Queensland (continued).

In addition the delivery cart, as well as the method of handling bread during delivery, has been made to satisfy requirements.

Small goods shopkeepers, who in the past exposed goods for sale under unhygienic methods by exposing them to dust, flies, and passing animals, have also been compelled to take steps to protect these articles before reaching the consumer, particularly in respect to vegetables, fruits, &c., which were formerly stored near the footpath, but now are raised and protected against pollution.

In order to secure compliance it has been necessary to take legal action, which resulted in a warning being administered to other offenders who were disinclined to fall in line with the better class of premises. Many of these small shops in the past made ice cream a particular part of their business, and where surroundings were by no means suitable, with the result that upon bacteriological examination they were found to be highly contaminated.

The department spared no effort in educating ice cream manufacturers in the necessity of absolute cleanliness, and when the premises were unsuitable notices were served prohibiting a continuance of the manufacture of ice cream until satisfactory alterations were effected.

A vast amount of analytical work has been performed during the year, and I now take this opportunity of expressing my appreciation to the Government analyst and his staff for the valuable assistance so ungrudgingly and cheerfully rendered.

SANITARY ADMINISTRATION.

This section embraces a very wide scope of work, and under the Health Acts power to deal with sewers, drainage, sanitary conveniences, garbage removal, offensive trades, as well as sanitation generally is provided.

To thoroughly carry out required conditions would necessarily entail a large increase in expenditure by local authorities, therefore this department has to be satisfied in securing compliance in respect of matters most prejudicial to health. Sewage disposal, sewers, water-tables are, correctly speaking, within the province of local authorities, and when those governing bodies fail in carrying out their functions this department is compelled to step in when appealed to by the public. This is particularly the case when concrete storm water tables have not been provided, resulting in objectionable collections of stagnating sewage forming a breeding place for mosquitoes as well as providing a nuisance to the neighbourhood at large. Many urban local authorities do not provide for even household wastes, and in many places there is a pronounced neglect of ordinary water channels. It is no uncommon sight to see filthy water lying stagnant in main thoroughfares. This should not exist, and I strongly condemn the apathy of local authorities in permitting same.

Local governing bodies generally realize that where closer settlement has been brought about drainage facilities require to be provided, but owing to war conditions and to the high cost of labour they are confronted with the all-important question of ways and means, and too often are inclined to consider their personal positions to the hygienic requirements of the community. In some areas the ratepapers have shown a great aversion to any increase in taxation in carrying out such work, rendering the position of councils' administration most difficult, and very often the dissenters are the principal complainants in the want of drainage facilities.

In spite of difficulties some councils have been progressive and alive enough to secure loans for drainage works.

In the metropolitan area, however, councils are somewhat diffident of making inroads into their finances, having in view the operations of the Water and Sewerage Board.

During the inspector's visits a general desire is displayed by local authorities in carrying out the requirements of the sanitary conveniences and night soil disposal regulations, and a marked improvement exists in closet construction.

The all-important question of dealing with the situ of noxious trades is becoming daily accentuated. Complaints regarding pollution of watercourses continue to be received, and investigation invariably proves that the complaints are not exaggerated but well founded.

The various trades giving off different chemical wastes, where closely situated, require to be carefully considered, as a collective disposal system will not answer. Greasy wastes must eventually render filtration beds futile and the adjacent soil bacteriologically sickened, therefore owners should obtain expert advice before incurring expense in dealing with the difficulty.

Whilst on this subject I have to point out that a serious condition of affairs has been caused in tidal watercourses, fish having become affected. In some instances numbers have died through the back water being pent up and not having sufficient get-away in dry seasons.

Certain of these trades have been prohibited from draining into watercourses discharging into the Brisbane river, and the onus of providing adequate measures for the purification of their individual wastes must be determined by the persons creating the nuisances.

Throughout the State sanitary disposal sites have been kept under supervision and defects met with have been remedied. In some few cases most crude and insanitary conditions were met with, flies and mosquitoes being much in evidence, the atmosphere was foul, and there was an utter lack of method through the work of the contractor not being kept under strict inspection.

On the whole local authorities, when pointed out the need for closer supervision and better conditions for working, have willingly complied, and on sub-

sequent visits improved conditions have generally been found to prevail.

NORTHERN SUB-OFFICES.

The inspectors stationed at Cairns, Townsville, and Rockhampton have continued to carry out food and sanitary duty with satisfactory results. The main centres in their respective areas have been visited, when business premises were inspected and the sanitary surroundings of each place received attention at their hands. It is pleasing to record that no friction has occurred in carrying out the provisions of the Health Acts and the requirements of the Food and Drug Regulations.

It must be admitted that the visits of these officers are not altogether welcomed by the public, as generally at the best, should no food sophistication be found to exist, some improvements as regards labelling or protection of food-stuffs and sanitary alterations to premises are required, and it is solely due to the display of tact that no trouble has occurred.

As a result of my recent tour in the north I was much impressed with the town and district of Mackay, so much so that I considered it imperative to place before the Minister the necessity of stationing a permanent inspector for the purpose of carrying out the provisions of the Health Acts and Regulations on similar lines to Cairns, Townsville, and Rockhampton.

NURSES' REGISTRATION BOARD.

The Board in the latter portion of the financial year recommended to the Minister that registrations under this section be no longer granted to nurses residing outside the State unless they intended following the calling of a nurse in Queensland, as it would be an injustice to our own nurses.

Registration under the above section was availed of through the provisions of the Acts relating to private hospitals being extended to certain centres, which necessitated persons having private lying-in homes to become registered. Such women were required before being granted State registration, in order to obtain a licence for their homes, to submit evidence of competency. Some cases of flagrant neglect in accouchement cases came under the notice of the Board, who, owing to those concerned not being State registered nurses, had no power to deal with them as would otherwise have been the case.

LABORATORY OF MICROBIOLOGY AND PATHOLOGY.

The Director reports that the examination of rodents and spleen smears for plague lesions and bacilli shows a considerable reduction when compared with past years. This is a serious matter and must not be lightly passed over, as should plague again appear in Queensland large numbers of rodents may become infected before the cause of deaths in rats is ascertained. The flea from infected rodents is the recognized medium by which plague is conveyed to humans, therefore the neces-

sity is apparent for increasing the number of examinations. The attention of local authorities, whose duty it is to deal with rat eradication, &c., under "The Rat and Mosquito Regulations of 1916," has been called to the danger, as it is felt that unless more activity is displayed some drastic steps will require to be taken to satisfactorily deal with the matter.

Bacteriological examinations are regularly made to determine the quality of the water supply in the metropolitan area. Three samples are submitted by the Water and Sewerage Board monthly, and three are also furnished for chemical analysis by the Government analyst.

CONCLUSION.

Queensland may well be congratulated on possessing such a splendid record from a health standpoint. Undoubtedly this is mainly due to our climate; sunshine is recognized as a safe means of destroying germ life antagonistic to the welfare of man and as a disinfecting agency are useful adjuncts to artificial disinfectants.

The total incidence of disease throughout the entire State shows a decline. This undoubtedly is a valuable economic asset of which we may be proud. A sickly population is nothing short of a national debacle. The contingent expense in providing and maintaining hospitals, asylums, and homes for the destitute proves annually a heavy burden on the community, and this condition of affairs can be principally attributed to preventable diseases. Typhoid fever, being one of the diseases that cause much havoc among workers, should, as the world becomes more enlightened, be reduced to a minimum. The splendid record established at the Front in respect to typhoid and small-pox stands out as a brilliant contrast to past war experiences, and its lesson must not be lost sight of in its application to private life.

REPORT OF HEALTH OFFICER.

The zymotic diseases most prevalent in the metropolitan area for the year were the usual ones, diphtheria and typhoid fever, but with regard to typhoid fever it is gratifying to note there has been a considerable reduction in comparison with the previous year, 1915-16, the rate of attack falling to about one-half of what it stood at during that period in the metropolitan area. This diminution of incidence has not been confined solely to the metropolis, but has extended to the country areas, where the fall exhibits even a greater prominence, amounting to considerably more than one half of what it was in the previous year. The period of greatest prevalence were the months of November, December, January, and February, December and January showing the greatest number of cases. By March, however, it commenced to dwindle in intensity and to fall gradually through the succeeding months

until the present time, when it maintains a very low level.

With regard to diphtheria there has been a slight reduction in the case incidence for the metropolitan area in comparison to last year, but in the outlying areas of the State it has maintained its customary persistence.

The periods of greatest prevalence have been the months of March, April, May, and January of the present year, although the curve maintained an even direction in the succeeding six months, and the cases were uniformly distributed through them. All cases that clinically resemble diphtheria should be reported as such without waiting for the result of microscopical examination, and if in such cases a negative result is obtained it should be disregarded, as diphtheria may be present and no bacilli be found, especially if the throat has undergone previous medication.

The quicker it is recognized the speedier the case can be isolated and antitoxin administered without delay, and so prevent the possibility of a fatal result and disposing of the necessity for operative interference of any kind. Local authorities can also resist the spread of infection to a great extent by ensuring that no child away from school with a sore throat missed bacteriological examination, and by putting section 3 of the Diphtheria Regulations, 1916, promptly into operation immediately on notification of a case, and with which all of them do not seem to be perfectly acquainted. All contacts of the disease should receive immunizing doses of antitoxin, as this tends to reduce the number of secondary cases of diphtheria in a family. Cases of cerebro-spinal meningitis have occurred throughout the metropolitan area during the year, but here again the case incidence has undergone a marked reduction compared with the previous year, the fall amounting to nearly one-half of that present during that period. All cases notified have been immediately followed up as far as possible and all contacts with the case swabbed for the detection of carriers, and isolation and measures of disinfection carried out so as to limit the spread of the disease in every way.

LAZARET, PEEL ISLAND.

The chief forms of the disease prevalent amongst the inmates were:—

- (1) Nodular leprosy.
- (2) Mixed leprosy.

The treatment for the year has been carried out exclusively with chaulmoogra oil, with the usual subsidiary aids, and, although there have been no discharges for the year, still there has been a considerable improvement amongst some cases of the Europeans and amongst one or two of the coloured inmates, so that their probable discharge may be looked for later on. Nothing much fresh has transpired during the year with regard to the therapeutics of leprosy. Takano (*Journal of Experimental Medicine*) has experimented with a compound known as cyano-cuprol in six cases of leprosy,

in which he states good results were obtained, but also added that after the fifth or a later dose anaphylactoid symptoms may set in, and this would act as a barrier to its utility as a general remedy in the disease; besides, the number of cases are too small to draw any conclusions from. The treatment, however, is still being carried out in a number of other cases, so it remains to be seen whether this remedy will establish itself as an effective means or only as an aid to the other forms of treatment, as many others have done.

Rogers, in India, in favouring gynecardate of soda, makes no claim to cure the disease with it, only that he has seen improvement in a number of cases from the use of it.

McCoy and Holman, of the United States, speak of the carbon dioxide snow treatment in this disease, but they only refer to a small number of cases again under treatment, and from which it is impossible to draw any practical deductions. All remained microscopically positive, and so showed no improvement.

None of these remedies, therefore, present any advantage in the treatment of the disease to that of chaulmoogra oil, which has stood the test of time against all of them, and Hopkins, in the *New Orleans Medical and Surgical Journal* of 1916, compares the results with chaulmoogra oil with other methods of treatment, in 269 cases extending over a period of fifteen years, since he has been visiting physician to the Lepers' Home at Louisiana, and states so strong has the conviction become with regard to the use of chaulmoogra oil that it is the routine practice to administer it to every case on admission to the Home.

Enrique Gomez speaks of chaulmoogra oil treatment at the Leper Hospital of Agua de Dios at Bogata, in which those under treatment lost all signs of the disease.

McCoy and Holman, again in "The Chaulmoogra Oil Treatment of Leprosy," review the literature on the treatment of leprosy by chaulmoogra oil. Many cases have benefited by its use, and any new substance will have to prove its merit before it can hope to displace the remedy in the treatment of the disease with a reputation extending over so many years and the high percentage of improvements.

RATS.

The number of rats destroyed in the metropolitan area for the year was 6,876, of which 1,808 were examined bacteriologically. This is a very inadequate number for a city the size of Brisbane. Regulations by an Order in Council were enacted placing the work of destruction of rats upon the local authorities, who were charged with the execution of these regulations within their own areas.

VACCINATION

has been carried out from time to time during the year in a spasmodic manner, those taking

advantage of it being mostly those proceeding to the Pacific-Islands, whose work or profession called them there with the intention of residing, and it was necessary to prove they had been successfully vaccinated before being allowed to enter the country.

J. E. THOMSON,

Health Officer.

REPORT OF DIRECTOR, LABORATORY OF MICROBIOLOGY AND PATHOLOGY.

Plague.—Examinations of rodents and spleen smears for plague lesions and bacilli showed a considerable reduction compared with last year.

In none of the specimens examined was any evidence of plague found.

Tuberculosis.—An increased number of specimens were examined for tuberculosis, and the number in which evidence of the disease was found showed a reduction both absolute and relative.

Typhoid Fever.—The number of blood specimens examined by the agglutination method for evidence of the presence of the typhoid-paratyphoid fevers was about two-thirds of the number examined last year.

As this possibly indicates, there is a corresponding reduction in the number of cases of fever notified, it is very satisfactory.

Leprosy.—An average number of specimens were examined for the leprosy bacillus, and the results showed a considerable decrease in the number in which it was found.

Diphtheria.—Owing to several small school outbreaks of the disease, there was an increase of approximately one-third in the number of swabs examined for the diphtheria bacillus.

Enthetic Diseases.—The number of specimens examined for syphilis and gonorrhœa was double the number mentioned in last year's report, due to extraordinary causes, as a large number were received from military authorities.

The number of specimens in which the gonococcus was found showed an increase out of proportion to the increase in the number examined.

Meningitis.—The diminution in the number of throat swabs submitted for examination in connection with meningitis should indicate a corresponding reduction in the occurrence of cerebrospinal meningitis during the year.

Owing to the subsidence of the small-pox scare it was not found necessary to make any more calf-lymph than was yielded by one calf.

JOHN J. HARRIS.

REPORT OF MEDICAL OFFICER FOR ENTETIC DISEASES.

Number of examinations made, 830.

Number of bloods taken for Wassermann reaction test, 252.

Those found suffering from gonorrhœa were immediately brought before a magistrate and with one doctor's certificate committed to Ward No. 12 for treatment; and further failing to satisfy the medical

officer in charge that they are free from disease, on three consecutive smears during the space of fourteen days they are recommitted.

Positive Wassermann cases showing any clinical signs of specific disease were also committed to hospital to undergo the treatment prescribed.

The new amendments under the Health Act stirred up the class of people under question for a short time and the attendance for examination increased and then decreased. The class of woman being examined at the examination rooms is comparatively clean to those who are described by patients attending the venereal clinic for treatment, and further, the regular attendants at the examination rooms do not correspond with those persons who are described as being the means of transmitting the disease to those sufferers who apply for treatment at the hospital, and unless some means be found to search out the type of woman referred to, the disease will continue, as it is doing, to carry on its insidious attacks on the innocent and otherwise in this community.

At the venereal clinic outdoor patients are seen and treated, and cases are sorted out for minor operations, &c., and received into hospital. Patients are also taken into the hospital from here and receive injections of arsenobenzol, and are then returned for further treatment. It is at this clinic that one finds out the type of woman who is responsible for venereal disease, from information sought in order to fill in notification forms. The type corresponds to that already referred to.

The attendance at out-patients' department was 3,060 males and 316 females.

NO. 12 WARD.

Number of cases admitted, 116.

This is the ward where the women who are recognized as prostitutes and suffering from venereal disease are committed to for treatment.

P. F. CROWE, L.R.C.S.I., L.R.C.P.I., L.M.

GOVERNMENT CHEMICAL LABORATORY.

The number of samples examined for your department during the year was 1,551, an increase of sixty-three samples on the work of the previous year.

Of the total number of samples submitted, 664 were "legal" samples taken by inspectors strictly in accordance with the provisions of the Health Act.

The following table shows the progress of the milk campaign during the last six years, the results being those obtained from legal samples:—

Year	Number of samples	Number of samples failed	Percentage failed	Average per cent. of added water
1911-12	... 265	... 69	... 26	... 12.0
1912-13	... 419	... 60	... 14	... 14.0
1913-14	... 385	... 57	... 15	... 13.5
1914-15	... 609	... 96	... 16	... 17.4
1915-16	... 442	... 79	... 18	... 14.7
1916-17	... 427	... 82	... 19	... 14.0

Colonial Medical Reports.—No 90.—Queensland (continued).

The proportion of adulterated samples in North Brisbane and South Brisbane is much higher than in previous years, and is probably due mainly to greater discrimination in sampling, not necessarily implying that the adulteration all round in those localities has increased in that increased ratio. The average proportion (19 per cent.) of samples adulterated is, however, much too high, and only more exhaustive sampling will reduce this result. In Queensland the number of samples of milk taken per 1,000 of the population amounted last year to 0.6, whereas in New South Wales for 1915 the number was 5.3, and the proportion of adulterated samples was 5.7 per cent. It evidently still pays to adulterate milk in Queensland and pay the fines when caught.

J. BROWNLIE HENDERSON.

REPORT OF MEDICAL OFFICER, CENTRAL TUBERCULOSIS BUREAU.

Since the beginning of this year forty cases have been examined. From these twenty-three were chosen as suitable for sanatorium treatment, being classified as follows: Seventeen belonged to Class 1, five to Class 2, and one to Class 3. In the seventeen of Class 1, one had laryngeal complications, and preferred to go to Sydney for special treatment; another for private reasons went to Diamantina. The remaining cases (twenty-one) were advised to go to Dalby. The unsuitable cases, seventeen in number, were referred to their own homes or Diamantina.

Eight ex-sanatorium patients came for advice, three of whom are still under treatment. By those patients who are unable to pay for private medical advice, this, I feel sure, will be taken advantage of as it becomes known.

I strongly advise more stringent examination of the environment of the intending patient, and a thorough medical examination of the rest of the family. Also, every case which has been discharged from the sanatorium as arrested or greatly improved ought to report themselves at stated intervals for examination. If this were done systematically, the majority of relapses would probably be averted.

Every effort should be made to facilitate the examinations of contacts and to ensure the supervision of arrested cases.

A. STEWART, M.B.

REPORT OF CHIEF SANITARY INSPECTOR.
METROPOLITAN AREA.

Within the metropolitan area 1,822 visits of inspection were made.

One hundred and sixty-two complaints in writing have been received during the year by the department and the causes of complaint investigated.

Where deemed advisable the local authorities were called upon to take the necessary action to abate the nuisances complained of.

DRAINAGE.

Closer settlement is rapidly taking place, together with the extension of the necessary water mains and reticulation generally, resulting in a large increase in the volume of household drainage to be disposed of, consequently the natural storm watercourses traversing these areas have in numerous instances been converted into sewers of the foulest description. Complaints regarding these have been continuous. At the present time there is no other means of sewage disposal than by natural water channels or storm water sewers.

POLLUTION OF STREAMS.

The continued pollution of creeks within the metropolitan area by the discharge of obnoxious trade waste water continues. Large volumes of foul wastes from tanneries, woolscours, and fellmongeries render the few streams of running water absolutely unfit for any purpose.

Dairymen allege that their cattle are dying as the result of the stock drinking the contaminated water. It is worthy to note that during the present dry spell, when domestic rain water tanks have given out, numerous residents are wholly dependent on these streams for water for all purposes. The question of removing these establishments to a proclaimed noxious trade area would mean a huge expenditure of capital, more so now, as some of the works have been wholly rebuilt and remodelled on more modern lines; but there is no reason why the owners of these establishments should not be compelled to adopt the best known means of purification of their trade waste water.

SANITARY DISINFECTION AND INFECTIOUS DISEASES.

One thousand four hundred and sixty-four cases of notifiable diseases have been reported to the department during the year as having occurred within the metropolitan area. Some sharp outbreaks of diphtheria have again occurred among the scholars attending State schools. Active measures were taken to circumscribe the spread of the disease and the usual precautionary methods for swabbing the throats of scholars and others were carried into effect for the purpose of discovering carriers. More than 2,000 swabs were taken and submitted for bacteriological examination and report.

As in former years, special precautions have been observed in the transport of lepers to Peel Island Lazaret, who are usually under the charge of an officer of the department, who attends to their personal comfort until finally settled in their new quarters. The cabins erected on the steamers for the transport of lepers are disinfected before demolition after the occupants have been transferred to the island lazaret.

Twenty railway carriages used for the conveyance

of infectious disease cases, and in addition one steamer utilized for the transport of leper patients from northern centres to Peel Island have also been disinfected.

Also two passenger steamers and four river dredgers were cyanided for the purpose of destroying rats and other vermin on board ship.

Eight State schools within the metropolitan area have also been thoroughly disinfected in connection with outbreaks of diphtheria.

CAMP SANITATION.

Since the establishment of the A.I.F. Military Training Camps at Enoggera, an officer of the departmental sanitary staff has been deputed to assist and advise in matters of sanitary executive. The work covered comprised disposal of drainage, general sanitary inspection of camps, prevention of pollution of watercourses, nightsoil removal, garbage incineration, and disposal of residue. The excellent manner in which these camps have been kept reflect much credit on the military officers responsible for their supervision, and who have courteously extended every assistance to this department's inspectors.

A very satisfactory and effective method of drainage precipitation and purification has been evolved at these camps. Photographs of the plant are subjoined herewith. Excess of lime is used, and the resultant effluent is perfectly clear and is discharged into running brooks without danger to stock drinking same. The effluent from a large septic tank installation at the headquarters permanent camp runs through one of these liming precipitation beds, together with the greasy kitchen wastes, with satisfactory results.

This effluent before final discharge into a natural storm water course undergoes further precipitation in two fairly large ponds. No lime, however, is added to the effluent in those ponds.

During the various inspections I have made of this particular installation I have not observed any mosquito larvæ present in the ponds.

CIVIC ECONOMY.

In many parts of the State townships spring into existence and frequently increase in size and importance at a fairly rapid rate. One of the problems which the officers of the shire councils have to face is the disposal of nightsoil and garbage, and having little or no knowledge of such matters, the state of affairs usually found by departmental officers on their tours of inspection is most unsatisfactory. As occasion demands the visiting inspectors are deputed to organize cleansing crusades, supervise the scavenging of the towns, and to generally place matters in a more hygienic condition before leaving the district.

The erection of garbage destructors is out of the question in growing communities as above referred to, and the department has adopted several methods

of refuse disposal which can be applied to suit the varying local conditions met with, and may be enumerated as follows:—

In many parts of the State the country is practically as level as a billiard table. In such instances, where easy sinking can be carried out, long, wide, deep trenches are dug, the refuse tipped in and set fire to. As each succeeding load of rubbish is deposited, all combustible matter is consumed by the continually burning refuse. It is surprising the amount of stuff such trenches will hold before being finally covered over with the earth dug from the succeeding trench. If circumstances do not warrant the excavation of trenches the garbage is tipped on the surface and fired until a depth of, say, 4 ft. to 5 ft. in height has been reached, a ramp or inclined roadway being formed in the meantime with old tins, the burnt residue, and any other solid material at hand, so that the refuse wagons or carts can in time draw up the ramp and tip the rubbish to a face; the sides of the tip and ramp being binded with fine material as the work proceeds. If the materials are handy the ramp and tip are formed forthwith.

In hilly country the most suitable spot in the depot is chosen, where the carts can commence depositing the refuse down the face of an incline and there set fire to. In a very short time a tip similar to the "mullock" heap or spoil tip at a mine is formed, and very soon becomes overgrown with grass. In such instances we insist on each load of refuse being set fire to on the top of the tip as it is brought in and the residue forked over the face when the next load arrives at the depot. By this means all old tins, &c., become filled up with fine ash, and prevent the breeding of mosquitoes.

In spewy country, that is where there is a bad bottom liable to be churned up by traffic in wet weather, I have recommended the utilization of all old petrol, kerosene, and other tins for the formation of a road bottom, which, on being dug out to a depth of, say, 2 ft. and filled in with the tins and then flattened out with a steam road roller until almost full, covered over with earth topped with gravel and properly cambered, stretches of good roadway have been formed where formerly vehicular traffic became bogged in wet weather.

Town refuse is also being utilized to fill up depressions in country roads to an even grade, malarial mosquito breeding swamps reclaimed, and roadways formed across portions of land liable to tidal influence. When this work is properly carried out as above briefly outlined, no nuisance results.

I have purposely given those few brief details as I have recently noted in a copy of the JOURNAL OF TROPICAL MEDICINE AND HYGIENE a discussion on garbage disposal, and the methods adopted in Queensland country districts may prove helpful to those interested in such matters and similarly circumstanced so far as climatic and economic conditions are concerned.

PLAGUE PREVENTION.

With the passing of the Rat and Mosquito Prevention and Destruction Regulations of 1916, placing on local authorities the onus of rat destruction work, the rat-proofing of premises formerly carried out by this department ceased. The services of the gang employed on this work were retained and utilized in rat destruction work on Government property and at shipping companies' wharves and meatworks, the latter having entered into an agreement with the department for payment of the services rendered. A rat gang of eight men is still retained by this department, principally employed in trapping and poisoning.

During the fiscal year 6,876 rodents have been accounted for. One thousand eight hundred and eight of these were fit for examination and forwarded to the Laboratory of Microbiology and Pathology for that purpose. The above figures do not represent the whole of the rats and mice destroyed, as with poisoning operations a large number of the rodents are unrecoverable.

Eight hundred and eleven 4-lb. loaves of bread were used in the manufacture of poison baits; 811,000 baits were made during the year, 806,000 baits were used, leaving a balance on hand of 5,000. Thirty-eight and a half pounds of poison were brought forward from the previous year. 644 lb. have been made during the past twelve months, 370 lb. used, 277½ lb. sold to the public and other Government departments, leaving a balance on hand of 35 lb.

OTHER PARTS OF THE STATE.

Itinerating inspectors have been despatched from the headquarters staff to various parts of the State. Each of these officers reports a decided improvement in the sanitary circumstances of many of the towns coming within the scope of their inspections. Since local authorities have been made chargeable for the treatment of infectious diseases cases occurring within their respective areas who may be admitted into a district hospital, it is having a salutary effect on some councils who were inclined to pay little or no heed to health matters. It is now being recognized by local government bodies that it is better to spend money on improving sanitary conditions than for the treatment of patients in a hospital.

DAYLIGHT CONSERVANCY.

It has been the policy of the department to encourage local authorities to introduce the collection and disposal of nightsoil by daylight, which ensures a more efficient service, and has proved eminently satisfactory. Considerable opposition was manifested in the initial stages of this reform. There is no nuisance with proper plant, and the department is satisfied that none of the progressive local authorities would again return to the old "night-owl" methods.

The reports submitted from places outside the metropolitan area reveal that good results have been achieved throughout the State in respect to sanitary administration.

Before concluding, however, I would like to here point out that from my own observations and experience, and those of my officers, it has been remarked that the sites of many of the towns and settlements in Queensland have been fixed in a haphazard manner, growing up in many instances adjacent to the camping grounds of the early carrying days, or near railway termini and stations as the lines were pushed out into the interior without any regard to hygienic conditions.

I would suggest that as future developments take place the selection of town sites be placed in the hands of a small commission of experts, consisting of, say, the Commissioner of Public Health, an accredited Government surveyor, and a civil engineer, who would go into the question of aspect, water supply, drainage, and the general future health requirements of succeeding generations without reference to vested interests at the time being.

JOHN SIMPSON, M.R.S.I.,
Chief Sanitary Inspector.

REPORT OF CHIEF FOOD INSPECTOR.

War conditions and the consequent unsettled state of trade and commerce have necessitated extreme care and discretion in the handling of many questions that have arisen in connection with food and drug work, and much tact and discrimination has had to be exercised at times to prevent dislocation of trade.

The routine duties of the food staff have included visits of inspection to wholesale warehouses, wharves, bond stores, markets, cold stores, cake and biscuit factories, canning establishments, tea packers' premises, ice-cream and ice factories, general stores, flour-mills, cereal packers, small-goods factories, wine and spirit merchants, hotels, aerated water and cordial factories, breweries, fish shops, oyster saloons, auction marts, wholesale and retail chemists, bakeries, restaurants, military canteens, sauce and condiment factories, boarding-houses, fruit shops, &c.

The work has also entailed visits to show-grounds, racecourses, camps, bottle-yards, street stalls, and the inspection of the various vehicles and utensils used to convey food for sale to the consumer.

The efficient performance of the duties outlined has at times necessitated the employment of the officers concerned upon early morning and late night work, and it has been necessary also on occasions to require their services on Saturday afternoons, Sunday mornings, and public holidays—more particularly in connection with milk sampling, in which work all of the food inspectors have at times participated.

Warehouses.—Stocks, although lower, are considerably cleaner, and merchants do not hesitate to ask the advice of the food inspector on any new lines coming forward.

This is in itself gratifying as an indication of the confidence reposed in the latter as a result of previous transactions.

Concerning canned fish, the shortage of shipments from Norway has brought the American competitor into the field, and so far his goods have been found of excellent quality.

Japanese goods have shown improvement in the get-up, and the lengthened keeping qualities of these lines lead one to believe that decided advances have been made by the packers in the actual preparation and handling.

On the preservative question correspondence between merchants and exporters has resulted in the landing in this country of goods, particularly cod-fish, which conform to official requirements.

Hotel Inspection.—During the period under review the fly-proofing with wire gauze of hotel kitchens in the metropolitan area has practically been completed, and the work is now being extended to outside areas.

Occasionally it has been apparent upon inspection and testing that the practice of refilling proprietary bottles with draught spirits has not entirely ceased, but still it is not so prevalent as in the past.

Kitchens in many of the country hotels visited were found in an extremely unsatisfactory and unsanitary condition and alterations ordered.

The fly-proofing of kitchens would have been further advanced but for the shortage of stocks of the required material, caused by war conditions.

Retail Stores.—Considerable progress in the general conduct of this class of business, more particularly in the arrangements that are made to protect susceptible food lines from contamination by flies and dust, has been made.

More care is now being observed in the stacking of goods inside and without the premises, the new regulations requiring vegetables and other food lines to be raised from the floor to such a height as to be beyond the reach of dogs.

The new regulations require bakehouses to be ceiled and lined and the door and window openings to be protected against flies and dust.

MILK SAMPLING.

The work of milk sampling has received as much attention as our small staff has been able to afford, and in this connection I desire to record my satisfaction with the manner in which it has been carried out.

A considerable number of samples of milk have been secured by these officers, sometimes under exceedingly trying and unpleasant conditions.

The prosecutions for milk adulteration, obstruction, refusal to serve, and attempted intimidation show that the inspectors have persisted in their efforts and have not been deterred by threats.

It is gratifying to record that as the result of our continued attack a number of milk-vendors who were not ornaments to the trade have abandoned such line of business and taken up other callings.

I am inclined to think that the practice of milk sophistication is on the wane, although still carried out to a fairly large extent.

An increase in our working forces and the rigid enforcement of the recently gazetted Milk Sellers Regulations, 1917, is what is required to give "milk fakers" a definite set-back.

BACTERIAL EXAMINATIONS.

Arising out of the reports furnished by Dr. Harris, five vendors of ice-cream and ices which yielded excess bacterial counts were prosecuted, and a conviction obtained in each instance. The average fine inflicted works out at £15 per case, highest £20, and lowest £10. This treatment should have a salutary effect upon the trade generally, and serve to indicate the need for the strictest care and cleanliness in every stage of the production and storage of such products.

PROSECUTIONS.

One hundred and thirteen prosecutions were conducted by the Headquarters Food Inspectors during the year against persons and firms for breaches of the Health Acts and of the Food and Drug Regulations.

In no single instance did a prosecution fail, a conviction being obtained and penalty inflicted in every case taken.

For selling adulterated spirits, thirty-six persons were prosecuted by the members of Headquarters Food Staff.

Miscellaneous food adulteration cases took place in eleven instances. Under his heading are included the selling of foods below standard, and having excessive bacterial counts, such as ice-cream and ices.

Miscellaneous Prosecutions.—Forty-six persons and firms were proceeded against for various breaches of the laws relating to the preparation and protection of food for sale, for refusing to serve inspectors with samples when demanded, obstructing officers in the execution of their duty, carrying water on milk carts, having dirty premises, &c.

The cases most severely dealt with in this section were the offences of refusing to serve an inspector, obstruction, carrying water on milk cart, attempting to intimidate an officer, and short-weight bread.

CENTRAL QUEENSLAND.

As a result of his observations Inspector Wiseman reports a general improvement all round in conditions surrounding the food supply.

The new Food and Drug Regulations have been carefully explained, and notices served to conform where necessary.

Colonial Medical Reports.—No 90.—Queensland (continued).**UNSOOUND FOODS, CENTRAL DISTRICT.**

The inspector, in submitting the list of deteriorated foods destroyed in the area under his control, explains that, although it shows an apparent increase, this is mainly due to one large shipment of bananas, which was over-carried to Brisbane and returned to Rockhampton in an unsound condition.

He further states that both the merchants and retailers have shown a marked desire to carefully conform to the regulations, and that the majority of the breaches of the same observed have been due to neglect and omissions of employees rather than to defaults of employers.

With regard to the foodstuffs destroyed, many hundredweights never pass through the inspectors' hands, as a mutual system has been arranged between the merchants so that no large quantities of unfit or doubtful food material are allowed to leave the wholesalers' premises.

During the fiscal year the inspector has exercised control over the food supply of the Townsville area in addition to his sanitary duties, and has also paid visits of inspection for the purpose of enforcing the food sections of the Health Acts and the Food and Drug Regulations.

PROSECUTIONS, TOWNSVILLE DISTRICT.

The list of prosecutions includes a series arising out of visits to the towns in the district as well as cases obtained in the City of Townsville itself.

The average fine for milk adulteration works out at £7 10s., and costs £1 4s. 6d. per case (two cases). For sundry breaches of the Food and Drug Regulations forty-two persons and firms in the area were mulcted in penalties totalling £70 6s. 6d.

In submitting his annual statement from Cairns, the inspector reports:—

A considerable portion of my time has been devoted to food work, and over 600 premises were inspected and notices issued when necessary regarding requirements for bringing up to standard premises utilized for the manufacture of foods for human consumption.

UNSOOUND FOODS.

During the twelve months under consideration I have witnessed the destruction of over twenty-four tons of deteriorated food material which was unfit for human consumption. The above figures are considerably over last year's. This is on account of large quantities of potatoes and fresh fruit being landed in a deteriorated condition.

PROSECUTIONS.

Proceedings have been instituted against thirty-six persons and firms. In thirty-three of these cases convictions were recorded and fines obtained. In one instance the case was dismissed. In two instances the cases have been adjourned *sine die* in order to obtain a ruling dealing on the subject.

Five bakers were proceeded against for the offence of light-weight bread, and a conviction obtained in each case.

Under the heading "Miscellaneous Prosecutions" are included seventeen cases, of which two were adjourned. A conviction was obtained in the other instances. The majority of prosecutions were against proprietors of refreshment-rooms and boarding-houses for exposing food for sale to contamination by flies and dust.

DRUGS.

The issue of the new Food and Drug Regulations in January of the present year necessitated considerable alteration of many of the labels describing drugs.

By arrangement with the Pharmaceutical Society a certain time was allowed in which to work off stocks of goods constituted and labelled in accordance with the requirements of the previous regulations, and this period has not yet expired.

It was considered by many persons when the new regulations were first issued that the clauses prohibiting the use of certain expressions in describing medicines were too drastic.

It was pointed out that in the long run these requirements were likely to work to the benefit of the packer, as with such information before him he would have something more definite to work upon when preparing labels than the previous somewhat vague prohibition of "misleading statements."

Already a number of faulty labels have been corrected, and a quantity are at present undergoing revision.

Amongst the amendments to the Principal Act was one conferring upon the Commissioner power to make regulations controlling the sale and use of poisons and for licensing dealers in poisons and registering their premises.

In addition to the above, on June 30 the long-deferred Milk Sellers Regulations became law, and before many days it is anticipated will be in active operation in the Brisbane metropolitan area.

H. W. PETHERICK,
Chief Food Inspector.

Colonial Medical Reports.—No. 91.—St. Vincent.

ANNUAL REPORT FOR THE YEAR 1916-17.

By CYRIL H. DURRANT, M.B.,

Colonial Surgeon.

KINGSTOWN, ST. VINCENT.

June, 1917.

VITAL STATISTICS.

The Registrar-General's returns show that the estimated population of the Colony at March 31, 1917, was 49,422.

The total number of births was 1,731—males 875; females, 856.

Still-births numbered 79.

The birth-rate was 37.04 per thousand.

The total number of deaths was 882 excluding still-births.

The death-rate was 19.44 per thousand.

REMARKS ON PARTICULAR DISEASES, &c.

Malaria.—This disease has been more prevalent in the Kingstown No. 1 and No. 3 Districts than in the other medical districts, the three districts mentioned providing 537 cases out of a total of 658 in the whole Colony for the year under review. In the preceding year a total of 482 cases was recorded.

Quinine has been distributed freely in the affected areas but no special anti-malarial work has to be recorded.

During the latter part of February and the month of March, the disease assumed alarming epidemic proportions in the Grenadine Islands of Union and Canouan which necessitated an extensive free distribution of quinine.

The District Medical Officers draw attention to the prevalence of yaws, infantile diarrhoea, and syphilis, while slowly but surely pulmonary tuberculosis claims its steady toll of victims, 203 cases with 58 deaths being recorded as against 158 cases with 36 deaths in the previous year.

Catarrhal fevers, of epidemic influenza type, were particularly common throughout the year in all medical districts, 1,121 cases with no deaths being noted.

ANKYLOSTOMIASIS (HOOKWORM DISEASE).

The campaign against this disease, operated with funds provided by the International Health Commission, carried out its work uninterruptedly throughout the year under Dr. P. B. Gardner, the medical officer in charge.

The following table shows the work accomplished during the year.

Summary of Work accomplished in St. Vincent, W. I., for the period April 1, 1916, to March 31, 1917.

Number of persons censused ...	8,997
" " microscopically examined ...	8,834
" " positive to ankylostome ...	4,894
" " negative to ankylostome ...	3,940
" " treated ...	3,918
" " cured ...	3,388

Educational Work.

	Number	Attendance
Lectures to schools ...	6	775
Public lectures ...	5	2,050
Total ...	11	2,825

Sanitary.

In addition the sanitary preventive work of providing "fly-proof latrines" and closets of an approved pattern has proceeded in spite of difficulties with commendable speed—459 new latrines were erected.

YAWS PREVENTION.

Owing to the difficulties experienced on account of war conditions in obtaining regular supplies of salvarsan (606) or its substitutes, the treatment of yaws in a central hospital for the whole Colony became fitful and inefficient.

It was, therefore, suggested that a system of travelling and local dispensaries might be instituted throughout the Colony to deal with the treatment of the disease.

The principle of local, as opposed to central, treatment at a hospital appeared to be a sound one, since it made for prevention by detecting and dealing with the disease in its earliest stages.

The idea was accordingly put into action on April 1, 1916, when each Government Dispensary and two travelling dispensaries opened their doors for the treatment of yaws, and together with the Yaws Hospital, reduced to a twenty bed basis, worked uninterruptedly during the year.

Early in January, 1917, owing to representations made, it became necessary to establish another dispensary at Fancy, a remote village at the extreme northern end of the island.

The work performed during the year under review is summarized in the following table.

Total cases treated ...	1,718
" discharged cured ...	689 = 40 per cent.
" still under treatment ...	687
" not accounted for (failed to return to complete treatment) ...	486 = 28.2 per cent.

RETURN OF DISEASES AND DEATHS IN 1916-17 IN THE COLONIAL HOSPITAL,

St. Vincent.

GENERAL DISEASES.

	Admissions	Deaths	Total Cases Treated
Alcoholism	2	—	2
Anæmia	—	—	—
Anthrax	—	—	—
Beriberi	—	—	—
Bilharziosis	—	—	—
Blackwater Fever	—	—	—
Chicken-pox	—	—	—
Cholera	—	—	—
Choleraic Diarrhoea	3	1	3
Congenital Malformation	—	—	—
Debility	5	2	5
Delirium Tremens	—	—	—
Dengue	—	—	—
Diabetes Mellitus	—	—	—
Diabetes Insipidus	—	—	—
Diphtheria	—	—	—
Dysentery	16	17	4
Enteric Fever	2	1	3
Erysipelas	—	—	—
Febricula	—	—	—
Filariasis	—	—	—
Gonorrhoea	38	—	40
Gout	—	—	—
Hypdrophobia	—	—	—
Influenza	4	—	4
Kala-Azar	—	—	—
Leprosy	—	—	—
(a) Nodular	—	—	—
(b) Anæsthetic	—	—	—
(c) Mixed	—	—	—
Malarial Fever—	93	1	93
(a) Intermittent	—	—	—
Quotidian	—	—	—
Tertian	—	—	—
Quartan	—	—	—
Irregular	—	—	—
Type undiagnosed	—	—	—
(b) Remittent	—	—	—
(c) Pernicious	—	—	—
(d) Malarial Cachexia	—	—	—
Malta Fever	—	—	—
Measles	—	—	—
Mumps	—	—	—
New Growths—	—	—	—
Non-malignant	6	—	6
Malignant	1	—	1
Old Age	10	2	10
Other Diseases	—	—	—
Pellagra	—	—	—
Plague	—	—	—
Pyæmia	—	—	—
Rachitis	—	—	—
Rheumatic Fever	—	—	—
Rheumatism	10	—	10
Rheumatoid Arthritis	—	—	—
Scarlet Fever	—	—	—
Scurvy	—	—	—
Septicæmia	—	—	—
Sleeping Sickness	—	—	—
Sloughing Phagedæna	—	—	—
Small-pox	—	—	—
Syphilis	—	—	—
(a) Primary	8	—	8
(b) Secondary	6	—	6
(c) Tertiary	85	—	102
(d) Congenital	1	—	1
Tetanus	4	4	2
Trypanosoma Fever	—	—	—
Tubercle—	4	1	4
(a) Phthisis Pulmonalis	—	—	—
(b) Tuberculosis of Glands	—	—	—
(c) Lupus	—	—	—

GENERAL DISEASES—continued.

(d) Tabes Mesenterica	—	—	—
(e) Tuberculous Disease of Bones	—	—	—
Other Tubercular Diseases	—	—	—
Varicella	9	—	9
Whooping-cough	—	—	—
Yaws	6	—	6
Yellow Fever	—	—	—

LOCAL DISEASES.

Diseases of the—			
Cellular Tissue	50	4	52
Circulatory System	—	—	—
(a) Valvular Disease of Heart	4	—	4
(b) Other Diseases	8	2	8
Digestive System—	—	—	—
(a) Diarrhoea	—	—	—
(b) Bill Diarrhoea	—	—	—
(c) Hepatitis	—	—	—
Congestion of Liver	—	—	—
(d) Abscess of Liver	—	—	—
(e) Tropical Liver	—	—	—
(f) Jaundice, Catarrhal	—	—	—
(g) Cirrhosis of Liver	5	1	5
(h) Acute Yellow Atrophy	—	—	—
(i) Sprue	—	—	—
(j) Other Diseases	1	—	1
Ear	—	—	—
Eye	38	—	39
Generative System—	—	—	—
Male Organs	54	—	54
Female Organs	161	2	163
Lymphatic System	12	—	12
Mental Diseases	2	—	2
Nervous System	21	1	25
Nose	9	—	9
Organs of Locomotion	9	—	9
Respiratory System	30	5	33
Skin—	—	—	—
(a) Scabies	—	—	—
(b) Ringworm	—	—	—
(c) Tinea Imbricata	—	—	—
(d) Favus	—	—	—
(e) Eczema	3	—	3
(f) Other Diseases	129	—	134
Urinary System	20	4	20
Injuries, General, Local—	—	—	—
(a) Striasis (Heatstroke)	—	—	—
(b) Sunstroke (Heat Prostration)	4	—	4
(c) Other Injuries	55	2	66
Parasites—	—	—	—
Ascaris lumbricoides	26	8	28
Oxyuris vermicularis	1	—	1
Dochmimus duodenalis, or Ankylostoma duodenale	15	1	15
Filaria medinensis (Guinea-worm)	8	—	9
Tapeworm	—	—	—
Poisons—	—	—	—
Snake bites	—	—	—
Corrosive Acids	—	—	—
Metallic Poisons	—	—	—
Vegetable Alkaloids	—	—	—
Nature Unknown	—	—	—
Other Poisons	—	—	—
Surgical Operations—	133	—	133
Amputations, Major	—	—	—
" Minor	—	—	—
Other Operations	—	—	—
Eye	—	—	—
(a) Cataract	—	—	23
(b) Iridectomy	—	—	—
(c) Other Eye Operations	—	—	31

The success of this scheme must entirely depend on the regular attendance at the dispensaries of those affected with the disease, for until they are cured they are necessarily a focus of infection to those about them.

PUBLIC HEALTH.

The work of the Government Sanitary Department and the fortnightly inspection of the district police have been carried out regularly throughout the year.

HOSPITALS AND ASYLUMS.

The total number of persons treated in the hospitals and asylums of the Colony for the year was 1,395.

The number of attendances returned under the Medical Relief Scheme was 18,817.

This return includes paupers, labourers, labourers' children under 10 years of age, police constables and prisoners at police stations.

COLONIAL HOSPITAL, ST. VINCENT.

June, 1917.

VITAL STATISTICS.

The population of the district, comprising the town of Kingstown and adjacent village of Edinbrough is estimated at 5,000 persons.

There were 179 births and 84 deaths, giving a birth-rate at 35.8 per thousand and a death-rate of 16.8 per thousand.

There were 7 still-births recorded.

RELATIVE MORTALITY IN THE DIFFERENT SEASONS.

	Cases	Deaths
1916 { April-June	1,122	25
{ July-September ...	1,323	26
{ October-December...	918	19
1917 { January-March	1,073	14

Sickness was more prevalent and the death-rate higher in the first half of the year—51 deaths being recorded as against 33 in the latter half of the year.

REMARKS ON PARTICULAR DISEASES, &c.

Of notifiable diseases recorded there were 128 cases of whooping-cough with 8 deaths, 81 cases of yaws, 63 cases of pulmonary tubercle with 12 deaths and 4 cases of leprosy with 1 death.

Among other diseases there were 368 cases of catarrhal fever (influenza) with 6 deaths, 159 cases of infantile diarrhoea with 16 deaths, 261 cases of syphilitic disease with 3 deaths and 20 cases of amoebic dysentery.

One hundred and eighty-five cases of malaria with one death were recorded as against 158 cases in the previous year.

GENERAL SANITARY CONDITION OF THE DISTRICT.

The sanitary condition of the town of Kingstown has been well maintained, due attention having

been paid by the sanitary inspectors to the prevention of mosquito-borne diseases.

VACCINATION.

Vaccination has been regularly performed each week throughout the year despite the difficulties of obtaining lymph regularly on account of the war and the impossibility of ensuring its transport on cold storage.

DISTRICT NO. 1, KINGSTOWN, ST. VINCENT.

June, 1917.

VITAL STATISTICS.

The population of the district is estimated at about 7,000 persons. There have been 200 hirths, 155 deaths and 7 still-births during the year, giving a hirth-rate of 28.5 per thousand and a death-rate of 22.1 per thousand.

PREVALENCE OF SICKNESS IN DIFFERENT SEASONS.

Catarrhal fevers were prevalent during the last quarter of the year. Malaria also was more commonly met with in the latter six months of the year 98 cases being recorded as against 54 in the first half of the year.

RELATIVE MORTALITY IN THE DIFFERENT SEASONS.

	Cases	Deaths
1915 { April-June	544	33
{ July-September ...	737	28
{ October-December ..	493	20
1916 { January-March	1,055	44

Sickness was more prevalent, and the death-rate highest in the last quarter of the year.

REMARKS ON PARTICULAR DISEASES, &c.

Of notifiable diseases recorded there were 89 cases of whooping-cough with 6 deaths, 146 cases of yaws, 59 cases of pulmonary tubercle with 12 deaths, 8 cases of leprosy with 1 death, and 7 cases of chicken-pox. Among other diseases, chronic ulcers (other than syphilis and yaws) account for 170 cases, the diarrhoeal diseases of children account for 145 cases with 16 deaths, while malaria provides 152 cases with 4 deaths.

GENERAL SANITARY CONDITION OF DISTRICT.

The general sanitary condition of the district has on the whole been very satisfactory throughout the year. Fortnightly inspections by police sanitary inspectors have been regularly carried out.

VACCINATION.

Vaccinations were regularly performed each week throughout the year. The lymph supplied gave good results. 215 children were vaccinated.

Colonial Medical Reports.—No 91.—St. Vincent (continued).

No. 2 DISTRICT.

BARROUALLIE, ST. VINCENT.

July 30, 1917.

VITAL STATISTICS.

Estimated population, 9,585; births, 339; deaths, 142; still-births, 8.

PREVALENCE OF SICKNESS IN THE DIFFERENT SEASONS.

The months of May, September, October, January and March seem to have been the months when sickness was most prevalent, if we may judge from the number of patients treated during those months.

RELATIVE MORTALITY IN THE DIFFERENT SEASONS.

Monthly.—April	... 18	July	... 8
May	... 10	August	... 9
June	... 11	September	... 8
Quarterly	... 39	...	... 25
Monthly.—October	... 20	January	... 14
November	... 9	February	... 16
December	... 5	March	... 4
Quarterly	... 34	...	... 34

REMARKS ON PARTICULAR DISEASES OCCURRING DURING THE YEAR.

Syphilis is widespread. Gastro-intestinal diseases cause no small amount of trouble, and are responsible for perhaps the greatest number of deaths; at any rate, in the infant. Whooping-cough has been fairly prevalent, and has borne heavily on the little ones.

Intestinal parasites are found almost everywhere, the most common varieties being the long round worm and the thread worm.

Some virulent cases of malaria appeared in Vermont in the Buccament Valley and in Layou. There were two deaths from this disease for the year.

Tuberculosis takes steady toll. This disease is mostly seen in Layou and Rose Bank.

The general sanitary condition of the district is fairly satisfactory, and the efforts made at cleaning up and keeping clean, are for the most part good.

Three hundred and nine vaccinations were successfully performed.

W. H. FORD,
Medical Officer, District 2.

No. 3 DISTRICT.

VITAL STATISTICS.

Estimated population, 10,870; births, exclusive of still-births, 313; deaths, 162; still-births, 33.

PREVALENCE OF SICKNESS IN DIFFERENT SEASONS OF THE YEAR.

Sickness was prevalent during the first quarter of the year under report, 1,159 cases being treated with a mortality of 47. The month of June is perhaps the worst month in the year, the cases treated in that month being 285, with a mortality of 19.

THE RELATIVE MORTALITY IN THE DIFFERENT SEASONS.

During quarter ending June 30,	number of deaths were 47
" " Sept. 30,	" " " 32
" " Dec. 31,	" " " 40
" " March 31,	" " " 45

REMARKS ON PARTICULAR DISEASES OCCURRING DURING THE YEAR.

Catarrhal Fevers.—251 cases were recorded with four deaths.

Syphilis.—163 cases were recorded with 37 deaths. A proper record with definite classification was kept for the six months from October to March inclusive, which gives the following:—

(1) Congenital—

	Cases	Deaths
(a) Legitimate	... 10	... 5
(b) Illegitimate	... 11	... 6

(2) Acquired—

(a) Primary	... 2
(b) Secondary	... 3
(c) Tertiary	... 27

Tertiary manifestations classified as:—

(a) Alimentary system—	
(1) Visceral syphilis	... 1
(2) Gumma of tongue	... 1
(b) Circulatory system—	
(1) Endarteritis	... 2
(c) Reproductive system—	
Endometritis	... 1
(d) Nervous system	... 4
(e) Locomotory system	... 13
(f) Diseases of Nose and Throat—	
Destruction of palate	... 5
Total	... 27

Malaria.—200 cases were recorded with 3 deaths; in November, December, January and February 127 cases were recorded, and out of this 52 alone in December; the majority of these cases were in Calliaqua and round about.

Children's Diarrhoea.—232 cases were recorded with 18 deaths.

Whooping-cough.—15 cases were recorded with 1 death.

Intestinal Parasites.—Chiefly *Ascaris lumbricoides* and the *Oxyuris vermicularis* are very prevalent; an extremely high percentage of children and a fair percentage of adults are infected with one or the other or both.

Ankylostomiasis.—The total number of cases recorded for the year were twenty-four, and these were recorded in the first half of the year; not one case was recorded during the latter half of the year.

The Ankylostomiasis Campaign has carried out its work in this district, and one does not come across the number of rusty-looking anæmic cases due to this malady that one used to see before the campaign started, and hence one can say that a great deal of good has been derived from this source. There are still a certain number of people uncured, and it is a doubtful point in view of this whether the good derived now will be permanent. As long as there are a certain number uncured there is always the possibility of infecting others. In an agricultural community such as we have it is well-nigh impossible to prevent infection, and though the immediate results of the campaign are giving satisfaction, and proper precautions are being taken with regard to sanitary arrangements where the people reside, there is no possible way of stopping the infection in the fields and along the various byways; supervision by the police or anybody else could never be so rigorous as to stop the nuisances that lead to infection, and unless this be done very probably in the next ten years or so we shall be as bad as ever again.

Dysentery.—111 cases were recorded with 9 deaths.

Pulmonary Tuberculosis.—38 cases were recorded with no deaths.

Yaws.—330 cases were recorded with one death. This disease was very prevalent during the year; 231 more cases were recorded during the year than the previous year. The district has no travelling Yaws Dispensary, and the yaws work is managed entirely by the medical officer and his dispenser. Great trouble is experienced in getting people to take advantage of the free treatment given for yaws, very few take a continuous course, a large number are intermittent, and the remainder, after coming once or twice, are either too lazy to come or find some difficulty or other. Then again the number discharged as cured does not include all that are cured; a certain number of the absentees are cured, but have not returned to report themselves. The method employed is as follows: All those that have the spots or yaws and are able to walk are given their treatment, which lasts one week, and are ordered to return at the end of the week for more; those that have ulcers and sores and are able to come, either walking or on a beast, get their treatment, and are ordered to come to the surgery thrice weekly to bathe and dress their ulcers. Those that are unable to come from any cause are enjoined to send for their treatment regularly, and are told when able to put in an appearance to let the medical officer see how they are getting on till cured.

GENERAL SANITARY CONDITION OF THE DISTRICT.

The general sanitary condition was satisfactory and shows some improvement, very probably the result of the sanitary efforts put forth under the Ankylostomiasis Campaign. I would, however, draw attention to the town of Calliaqua, which is

so low-lying, and not having proper drains, malaria is practically endemic, and at some future time when funds are available they should be directed to carry out improvements in Calliaqua.

Three hundred and eight vaccinations were successfully performed during the year; the lymph supplied was on the whole good.

GENERAL REMARKS.

As far as treatment for yaws goes, we have had time to see whether salvarsan was a specific or not. As far as I am able to trace it, I find that its action as a specific is extremely doubtful. Numbers of cases are apparently cured to the naked eye—that is, the unsightly yaws about the body disappear, and they are discharged. Salvarsan has been supposed to have cured them, but some time after tubboes make their appearance. The tubboes I look on as a late manifestation of the disease, for I have never come across a case of tubboes that has not had the yaws at some time or other. The appearance of the tubboes in those who have previously undergone salvarsan treatment shows either that they did not have enough salvarsan, or in all probability that salvarsan is not a specific.

Several cases of acute irritant poisoning were discovered by the medical officer which turned out to be arsenic. It was brought to the notice of the colonial surgeon, and the matter was promptly dealt with. Taken all round, there was more sickness in the district during the year than in the previous year; the relative mortality, however, was lower, standing at a little over 4 per cent, as regards to cases of sickness, and a little over 1 per cent, as regards to population.

W. A. GEORGE,
Medical Officer, District 3.

No. 4 DISTRICT.

THE CEDARS,
July 22, 1917.

There were 249 living births, 10 still-births, and 131 deaths.

There is no record of any serious epidemic, and cases of sickness seem to have been fairly uniformly distributed throughout the year.

Catarrhal fevers were most prevalent during the first quarter, and infantile diarrhoea as usual was prevalent throughout the year, the largest number of cases occurring during the last quarter.

The highest mortality occurred during the last quarter; the lowest during the second quarter. The following table shows the distribution of deaths in the different months:—

April ... 13	July ... 11	October ... 8	January ... 14
May ... 16	August ... 7	November ... 4	February ... 12
June ... 14	September ... 6	December ... 13	March ... 13
43	24	25	39

It will be noticed that the mortality during the six months, July to December, was distinctly lower than in the remaining six.

Yaws, syphilis and infantile diarrhoea furnish the largest number of cases. At the Cedars Dispensary 137 cases of yaws were admitted, and of these 104 were discharged apparently cured. At South Rivers Dispensary 89 cases were admitted and 56 discharged as cured. There were 68 cases of syphilis recorded and 96 cases of infantile diarrhoea with 25 deaths. Only 17 cases of malaria are recorded for the whole year under review with no deaths. There were 8 cases of pulmonary tuberculosis.

The general sanitary condition of the district was good throughout the year.

The number of successful vaccinations was 211. The people bring their children quite readily, and give but little trouble in this respect.

The health of the district was good throughout the year. A mild epidemic of influenza with no fatalities seems to have occurred during the first quarter of the year under review. Some cases of dysentery also occurred with 2 deaths, but at no time did this assume an epidemic form.

D. A. GREAVES,
Medical Officer, District 4.

NO. 5 DISTRICT.

GEORGETOWN HOSPITAL,
ST. VINCENT.

VITAL STATISTICS.

Estimated population, 4,706; births, 175; deaths, 97; still-births, 5; birth-rate, 37.2; death-rate, 20.6.

PREVALENCE OF SICKNESS IN THE DIFFERENT SEASONS OF THE YEAR.

An epidemic of whooping-cough made its appearance in December. It spread rapidly, and by March had reached its maximum.

Catarrhal fevers were most prevalent during December to March period.

RELATIVE MORTALITY IN THE DIFFERENT SEASONS.

April to September, deaths, 53; October to March, 44.

Distribution of Deaths by Quarters.

1st quarter ...	27	3rd quarter ...	24
2nd quarter ...	26	4th quarter ...	20

Distribution of Deaths by Months.

April ...	12	August ...	10	December ...	5
May ...	5	September ...	9	January ...	8
June ...	10	October ...	9	February ...	2
July ...	7	November ...	10	March ...	10

REMARKS ON PARTICULAR DISEASES.

Whooping-cough was epidemic during the last quarter of the year. Out of 88 cases recorded there was fortunately only 1 death.

Amongst other diseases treated during the year the most prevalent were yaws, catarrhal fevers, ulcers (non-specific), syphilis and diarrhoea amongst children; the most fatal were phthisis, diarrhoea amongst children, and syphilis.

Yaws.—151 cases were treated at the Georgetown Dispensary; 47 were discharged as cured. The temporary dispensary at "Fancy" Estate, opened in January, has done useful work. It is certain that those who availed themselves sufficiently of the facilities afforded for dressing their sores had their sufferings much relieved thereby. The disease is prevalent everywhere in the district.

Phthisis merits attention. Only a small percentage of cases of illness treated was phthisical—0.6 per cent.; but the disease yielded a mortality of 40 per cent. It would also appear to be on the increase.

Syphilis must be kept in mind, for it is a serious menace to life, efficiency and social happiness. 4 per cent. of the total numbers of cases of illness were syphilis; the mortality was 19 per cent.

Gonorrhoea should also be mentioned. It is alarmingly common.

Diarrhoea amongst children is a disease that calls for earnest consideration. It is very prevalent and yields a high mortality. It is in most cases associated with intestinal parasites, and is bound up with the primitive sanitary conditions. Its mortality during the year was 23 per cent.

GENERAL SANITARY CONDITION OF DISTRICT.

Personal hygiene and general sanitation are backward; yet there are signs of awakening to the benefits of keeping houses and surroundings clean. The regular sanitary inspections have insured a satisfactory standard of cleanliness.

One hundred and forty-five vaccinations were performed. The lymph was good. Approximately 83 per cent. of the children born were vaccinated successfully.

ANTI-MALARIAL MEASURES.

Monthly inspections by the police sanitary inspectors of receptacles for water were carried out, and thickened vegetation in various parts of the district was trimmed.

C. M. AUSTIN, M.B.

REPORT OF THE CHIEF HEALTH OFFICER.

SANITARY DEPARTMENT, KINGSTOWN,

June, 1917.

PARTICULAR DISEASES OCCURRING.

The public health of the Colony has not been disturbed by any particular or important epidemic during the year.

Of diseases notifiable under the Public Health Ordinance, 1910, 20 cases of chicken-pox, 3 cases of enteric fever, 370 cases of whooping-cough, 1,041 cases of yaws, and 203 cases of pulmonary phthisis have been recorded.

Sporadic cases of chicken-pox have been recorded in medical districts.

Three cases of enteric fever occurred.

Whooping-cough has been reported in all medical districts, 370 cases with 20 deaths being noted. Yaws and pulmonary tubercle are reported in all districts.

Malarial fever, reported last year to be prevalent in the valleys around Kingstown, has maintained its presence in spite of regular fortnightly visits of the sanitary inspector. In the year under review an increase in the number of cases is noted as compared with the previous year.

The supply of milk for the use of public institutions has continued to be obtained from the Camden Park Dairy erected two years ago.

The bakeries and soda water factories have been frequently inspected during the year, and improvement is to be noted in the sanitary condition maintained. In the bakeries sanitary inspectors should be on the alert to prevent baker boys from sleeping on dough troughs, a practice which appears to be gaining ground, and to enforce the regulation as to bakers wearing clean bibs.

The sanitary condition of the Colony has on the whole been well maintained, but organized efforts are still necessary to maintain the ground gained, and there is room for improvement. In Kingstown "the disposal of refuse," in the absence of any process of incineration, should be carefully considered, and dumping grounds should be carefully selected, and all vegetable and stable refuse immediately covered with earth when dumped. In the rural districts around Kingstown particular attention requires to be paid to stagnant drains and "crab-holes." The increase in cases of malaria is a sure index that faults are to be found here.

The meat on sale at the meat market in Kingstown was inspected daily by the Government veterinary surgeon.

The rat campaign has proceeded without interruption during the year.

Three thousand one hundred and fifty-eight rats were dissected and examined by the Rodent Examiner. No infected rats were found.

CYRIL H. DURRANT, M.B.,
Chief Health Officer.

REPORT ON THE COLONIAL HOSPITAL.

COLONIAL HOSPITAL, ST. VINCENT,

June, 1917.

There were 1,036 cases admitted to the wards of the General Hospital during the year, making, with 56 cases remaining over from 1915-1916, a total of 1,092 cases treated.

In addition 13 cases were admitted to the Graham Wing, 12 as private paying patients, and one, an inmate of the Thompson Home, nominated for free treatment. Of these 13 cases one, a case of albuminuria with convulsions, died.

The total number of cases, therefore, treated at the hospital for the year under review was 1,105, 304 more than in the previous year.

Of the cases admitted to the wards of the General Hospital, syphilis in one or other of its various manifestations accounted for 117 admissions, ulcers (other than those of syphilitic or frambesial origin) for 126 admissions, and intestinal parasites (*ascaris* and *ankylostoma*) for 44 admissions. There were 93 admissions for malaria with 1 death. Pulmonary tuberculosis provided 23 cases with 5 deaths.

There were 48 deaths, giving a death-rate of 4.3 per cent. of the total number of cases treated. The daily average number of inmates was 55.

The number of cases admitted to the maternity department during the year was 125, of which one died from rupture of uterus. This case was brought in *in extremis*, and after efforts at craniotomy had failed to deliver. There were 4 still-births.

There were 4,436 patients treated at the outpatient department, which is also the dispensary for the Kingstown district. Of these 84 died, giving a death-rate of 18.8 per thousand.

CYRIL H. DURRANT, M.B.,
Medical Officer, Kingstown District.

Colonial Medical Reports.—No. 92.—Falkland Islands.**ANNUAL MEDICAL REPORT FOR THE YEAR 1917.****By JOHN CRADDOCK,***Acting Colonial Surgeon.*

STANLEY,
February, 1918.

Twenty-one (twelve males and nine females) patients were admitted to the hospital during the year. There was one death in the hospital.

Thirty-one patients were treated in their own homes, twenty-one being gynaecological.

The children in the Government School were medically examined at intervals during the year. Over 20 per cent. of the children in Stanley suffer from enlarged tonsils or adenoids. Urgent isolated cases may be treated, but it is difficult to operate on large numbers without adequate assistance and in consequence little can be done until the arrival of a second medical officer. The condition of the teeth of most of the school children is still very unsatisfactory, and parents should avail themselves more of the opportunity of sending their children regularly to the Colonial Dentist's Surgery.

Shipping and Quarantine.—Twenty-five vessels were given Pratique during the year, as against fifty-one the preceding year. Three cases were admitted to the K.E.M. Hospital: two from whaling vessels (surgical), one from a sailing vessel (medical).

Public Health.—Exanthems, two cases of chicken pox. Phthisis, three cases, one death. With regard to the latter, none of the patients were inhabitants of Stanley. Owing to there being no suitable accommodation in Stanley for the proper isolation treatment of such cases, patients suffering from this disease are advised to remain in camp, as open-air

treatment is easier to carry out there, and there is less risk of the disease spreading than if they live in the crowded houses in Stanley; a suitable diet is also easier to obtain. During the later months of the year, November and December, a large percentage of the population of Stanley suffered from gastritis and enteritis. This was probably due to the very dry weather, followed by two or three days' heavy rain. Residents in Stanley, relying as they do on rain-water collected from the roofs, should realize that their tanks of drinking water should be thoroughly cleaned periodically, as the sediment that collects at the bottom of the tank almost invariably cause intestinal trouble when stirred up by a heavy fall of rain following a prolonged drought. The only cases (three) coming under my notice from camp were from a station on which the water used was partly roof water and partly spring water.

The general health of the Colony was better than during the two previous years. There was less sickness than in 1916; possibly this was owing to the fact that about 150 workmen had left Stanley and there was consequently less crowding in the houses.

The Camp.—There was less sickness than usual; several stations were not visited at all during the year except in passing through, and the cases at the rest were chiefly accidents.

JOHN CRADDOCK,
Acting Colonial Surgeon.

Colonial Medical Reports.—No. 93.—Jamaica.**ANNUAL REPORT OF THE CENTRAL BOARD OF HEALTH FOR THE YEAR ENDED MARCH 31, 1917.**

The year under review was not unusually marked by the prevalence of epidemic disease. In October, 1916, an outbreak of dysentery occurred in some of the villages. The Governor, at the suggestion of the Central Board of Health, requested the Parochial Board of St. Ann to take action under section 17 of Law 35 of 1910, for the purpose of investigating the cause of the disease and of doing what was necessary to prevent its spread. The Parochial Board promptly took the required action.

In December, 1916, an outbreak of enteric fever

occurred in the town of Sav-la-Mar (Westmoreland) and its suburbs. The Central Board of Health suggested to the Government that a Superintending Inspector be appointed to investigate into the outbreak and to see that the necessary steps were taken to arrest its spread. The Board felt that the outbreak was a serious one—twenty-seven cases of the disease having occurred in one locality in twenty-one days—and in view of the possibility of its spreading, that the presence of a qualified investigator was a matter of much importance in dealing with the

situation. The Board is not without hope that on the return of normal conditions the appointment of such an officer will receive consideration.

During the year the undermentioned diseases were declared by the Governor in Privy Council to be notifiable under the law:—

Ophthalmia Neonatorum for the whole island.

Dysentery in the Parish of St. Ann for a period of three months.

Chicken-pox in the Parish of Kingston for a period of one year from October 1, 1916.

Whooping-cough and *Measles* in the Parish of Kingston for six months from November 15, 1916.

The Parochial Board of St. James submitted a by-law for approval prohibiting the preparation of hides for tanning in the town of Montego Bay, the Medical Officer of Health having advised that such work is injurious to health and a nuisance to surrounding districts. It was found that a declaration that the preparation of hides for, or by, tanning within the town of Montego Bay is a "noxious business" within the meaning and for all the purposes of the Health Law 35 of 1910, would be sufficient to meet the case. Such a declaration was approved by the Governor in Privy Council on October 4, 1916.

The Parochial Board of Westmoreland, acting on a report from a District Medical Officer in that parish to the Superintending Medical Officer, as to the danger which might result from eating the fish known as Baracoota, asked the Central Board of Health to take steps to prohibit the sale of the fish. The Board was not disposed to take such action, as it was represented to them by a District Medical Officer in the parish neighbouring to Westmoreland that no ill-effects would result to those eating the fish if it was prepared for food as soon as caught, also to the fact that its consumption as food might prove injurious only in certain seasons of the year. The Parochial Board were asked to furnish further particulars in support of their recommendation that the sale of the fish should be prohibited as being a dangerous article of food. No further particulars have been received.

During the year the resolution of the Parochial Board of St. Ann fixing the limits of the several towns and villages in the parish for sanitary and other purposes was approved by the Governor in Privy Council.

The Secretary to the Board of Visitors of the Government Industrial Schools submitted a copy of a petition to the Government from the members of the Board with regard to the insufficiency of the water supply at Stony Hill, pointing out that during periods of drought the cleanliness and health of the inmates of the Reformatory have been seriously menaced through insufficient water supply, and asking that the Government should provide money to secure an adequate water supply which would be available for all the residents of Stony Hill and which would probably provide sufficient revenue to meet the sinking fund and interest. The Central Board of Health submitted the petition to the Government and strongly recommended that pro-

vision be made for securing an adequate water supply for the Institution, as at times water has to be carried from the river to the Reformatory owing to the absence of water in the tanks. It was found impossible in the present financial condition of the colony for such a scheme to be considered.

YAWS.

The Parochial Board of Clarendon forwarded copy of a resolution passed by them with reference to the prevalence of yaws in the parish, and asked the Central Board of Health to co-operate with them in the effort to obtain from the Governor a loan of £500 for the purpose of eradicating the disease.

The Board's resolution was forwarded to the Government with the recommendation that the loan should be made to the Board for the purpose indicated.

SYPHILIS.

The Parochial Board of Manchester reported the prevalence of syphilis in the parish and asked the Central Board of Health what action they would recommend in the matter. The Board were asked to supply reports from the Medical Officer of Health as to the prevalence of the disease, and such reports were submitted and disclosed that the disease is prevalent throughout the parish, its ravages being observed among the grown up as well as the juvenile members of the population.

The Parochial Board were informed that a sum of money had been provided by the Government for the treatment of venereal disease throughout the island and that as soon as a supply of drugs was available a start would be made, meanwhile it was suggested to them that steps should be taken to impress on the peasantry the necessity for their attendance at the Public General Hospital for treatment.

KINGSTON AND ST. ANDREW UNION POORHOUSE.

The Mayor and Council of Kingston forwarded a copy of a resolution passed by them that a select committee of three members of their Council, three members of the Parochial Board of St. Andrew, and three members of the Central Board of Health should be appointed to consider and report on the question of the necessity for, and the best means of making provisions for the separate accommodation of inmates of the Kingston and St. Andrew Union Poorhouse who suffer from contagious and infectious disease, and asked that if the suggestion met with the approval of the Central Board of Health three members of the Board be appointed to serve on the committee.

The Central Board of Health approved of the suggestion, and the Hon. Dr. J. E. Ker, Dr. L. Gifford and Dr. D. J. Williams consented to serve on the committee. A copy of the report of the committee was forwarded to the Central Board of Health, and by resolution, dated May 26, 1916, the Board decided that they approved of the recommendations in the report by the joint committee

of the Mayor and Council of Kingston, the Parochial Board of St. Andrew and the Central Board of Health:—

(1) That it is advisable and necessary for the infective cases now admitted and maintained in the Union Poorhouse to be maintained and dealt with in a hospital or hospitals specially provided with its own medical officers and staff of nurses.

(2) That it is inadvisable for the present condition of admitting and maintaining such cases at the Union Poorhouse to continue and that the same should be put an end to without any delay whatever.

The Mayor and Council of Kingston and the Parochial Board of St. Andrew were requested to take such steps as may be necessary for carrying out the recommendations contained in the report.

The Parochial Board of St. Ann have submitted reports from their medical officers of health with regard to the insanitary and unsatisfactory condition of the latrine system of the parish, more especially at the Government elementary schools, and suggest that the Education Department should be moved to approach the Government with the recommendation that the Public Works Department should undertake the construction of suitable Government school latrines throughout the parish.

At the close of the year under review the matter was still under consideration.

M. C. SOLOMON

KINGSTON.

The city and parish of Kingston is situate to the south and east of the Liguanea plain, sloping gently to a sea-board of about five miles in extent. It covers an area of about seven square miles. The estimated population at the middle of 1916 was 59,275, with a density of 12.9 persons to the acre.

The parish is divided under the scheme of reorganization into four districts for sanitary purposes and a sanitary inspector is responsible for each district.

There is a Superintendent of Street Cleaning, who is assisted by one inspector and one foreman. These officers supervise the work of the general scavenging of the city.

One of the sanitary inspectors is a "Trades" Inspector, whose duties involve the supervision of food-shops, bakeries, dairies, factories, offensive trades, street vendors and restaurants.

Each domestic inspector is also responsible for anti-mosquito and anti-plague work.

A rat-catcher works on the foreshore and at the various wharves; all rats caught in this area are submitted to the Government Bacteriologist for examination for *Bacillus pestis*.

Houses and compounds as a rule are kept in a clean and orderly condition. In the slum areas, of course, there are the usual squalid conditions and problems of housing to be met with in all poor townships.

The people are orderly and amenable to tactful

treatment by the officers, with the result that the officers receive great assistance in the carrying out of their difficult duties.

Prevalence of Sickness.—Malaria, enteric fever, tuberculosis and pneumonia were the diseases most prevalent in the order named—influenza, measles and chicken-pox were very prevalent. Influenza and measles being of a severe and aggravated type, many cases of pneumonia were no doubt secondary to both these diseases.

Water Supply.—The water is reputed to be of good potable quality. The supply is under the control and direction of the Kingston General Commissioners, and a monthly examination and report is, I believe, made both by the Government Chemist and the Government Bacteriologist.

I have not the advantage of a personal inspection of these reports as copies of the reports are never forwarded by the Managing Commissioner to the Health Department. No doubt this is an oversight which will be remedied in the future. It is somewhat of a paradox that the Health Department, who are *ipso facto* the guardians of the public health of the city and parish, should not have automatically a first-hand knowledge of the monthly analyses.

Enteric fevers and other intestinal disorders are endemic here, and without losing sight of the fact that there are other sources of infection it must not be forgotten that experience has shown that these disorders are for the most part water-borne.

In this connection I would refer to and repeat the remarks in my Report for 1914 as to the improvement which would result to the water supply of Kingston by the provision of suitable and additional storage reservoirs. I respectfully suggest that such storage reservoirs might be established on the extensive lands at Mona recently acquired by the Kingston General Commissioners. Such storage for say seven days should prove of the greatest value in further improving the potable quality of the water supply.

Dr. A. C. Houston, the Director of Water Examinations of the Metropolitan Water Board, than whom there is no greater living authority on water supplies, has made the following assertion with regard to the storage of water. "The chemical and bacteriological changes occurring in river water, under conditions of storage have been fully considered, the Chelsea, Lambeth, Staines, and other reservoir results being used as examples. The conclusion reached is that river water is usually greatly improved, both chemically and bacteriologically, by storage and that an adequately stored water is a safe water from an epidemiological point of view."

Quoting from Notter and Firth, under the heading "Water Storage and Delivery," the following occurs: "Experience shows that the larger the storage reservoirs and the longer the water can be retained in them, the greater is the self-purification obtained. The recent extension in area of storage reservoirs in the vicinity of London has resulted in a material improvement in the quality of the water supplied."

Latrine System.—A section of the city is connected with a water carriage sewer system, controlled by the Kingston General Commissioners. In other sections the pit closet is the common convenience in vogue.

Disposal of Rubbish.—There is an organized cart service for the collection and disposal of dry refuse. Collections are made daily in certain sections of the city and two or three times in other areas. The carts have tarpaulin covers which are adjusted after filling. The refuse is dumped at a deposit ground. Liquid waste goes into the sewerage system and is pumped to the outfall into the sea beyond Harbour Head to the east of Kingston.

A certain amount of sullage water gains access to the water tables or street gutters, and helps to create nuisance on the streets and in the gullies.

With a general sewerage of the city this nuisance would automatically cease and the good effects would be very obvious.

Housing of the Poor and Overcrowding.—In the slum areas there are the usual squalor and unwholesome conditions due to poverty and overcrowding. These areas should be taken in hand at the first opportunity and good houses and paved thoroughfares substituted. This would result in greatly reduced morbidity and mortality rates in districts which are now notoriously the breeding grounds for disease.

Relative Mortality in Different Seasons.—The total number of deaths for the calendar year was 1,739, giving a death-rate of 29.3 per thousand in a population of 59,275, estimated at June 30, 1916. The principal causes of death were certain of the infectious diseases.

Malarial fever was accountable for forty-two deaths as against twenty-five for the previous year.

Table showing the relative mortality of certain infective diseases and malaria:—

Enteric fever	...	...	59
Pul. tuberculosis	...	...	191
Pneumonia	...	...	64
Intestinal affections	...	...	238
Malarial fever	...	...	42

The death-rate from this group excluding malaria works out at 9.27 per 1,000. The malarial rate being 0.7 per 1,000, and the rate from all other causes 19.33.

Heart disease, nephritis and other chronic diseases go to make up the bulk of this rate.

Enteric Fever.—Fifty-nine deaths were registered under this head, this is an increase of seventeen over the figures for 1915.

The chief local causes of enteric fever in this city and parish are: (1) the unwholesome and abominable pit closet; (2) infection of foodstuffs; (3) the carrier.

These three causes are so interdependent that they must be treated as a whole.

The distribution of the disease is also interesting inasmuch as the largest number of cases occurred in slum areas of the city.

I again take the opportunity to respectfully suggest the adoption of anti-typhoid inoculation as a prophylactic measure in the public elementary schools, Government institutions, police and hospitals and for those members of the general public who would be willing to submit to protective inoculation. I understand that Dr. L. Crooks, the Acting D.M.O. of the Stony Hill District of St. Andrew, has made some use of this measure at the Reformatory Hospital. The results of this pioneer move should prove of the greatest interest and value.

Pulmonary Tuberculosis.—There were 221 notifications with 191 deaths from this cause.

This disease is also most prevalent amongst the poor and is therefore commonest in the slum districts, no doubt the terrible dust problem existing in this city may be partly responsible for its prevalence.

Intestinal Affections.—These disorders were very much in evidence, and carried off a number of children under 1 year. It is regrettable that the yearly record of deaths from this cause should be so high. There were 237 deaths under this head giving a rate per thousand of 3.99.

The same causes may be attributed to account for the prevalence of these affections as for enteric fever, and the districts affected are found to be pretty much the same.

Malaria.—There were 302 cases reported from the public hospital. A number of these occurred outside this parish, but were notified from hospital. There were 42 deaths giving a rate of 0.7 per 1,000. The increase under this head is no doubt due to the heavy rainfall for the past two years coming after a series of dry years. Experience shows that malarial incidence is greatly affected by rainfall, and when cases of malaria are constantly being imported from other countries and districts there is bound to be increased prevalence, unless a place was in the very happy situation of being absolutely free from Anopheles mosquitoes, a position that can only be achieved by the intelligent disbursement of a considerable sum of money on some properly organized plan.

Distribution of Malaria.—Total, 302; City, 85; outside the city, 143; origin unknown, 74.

Parasites were found in 225 of the cases reported.

Vaccination.—Return of vaccinations: Total, 1,061; successful, 1,043; unsuccessful, 18.

It may be said that the adult population is not well protected against small-pox, re-vaccination not being a compulsory measure. It appears to me to be advisable that all incoming alien immigrants and especially Orientals should be vaccinated before being given pratique at this port. It is a measure of self-protection that suggests itself as being necessary in view of the opening of the Panama Canal to the shipping of the world, an occurrence which must necessarily immediately place this port into closer touch with parts in the East in which small-pox prevails practically all the year round.

Colonial Medical Reports.—No. 93.—Jamaica (continued).

Pneumonia.—There was a marked increase in the prevalence of this disease, especially in the last quarter of the year. This was probably contributed to by the unusual and prolonged cold season for which the poor had no special provision of warm clothing or blankets. It is possible also that a virulent strain of pneumococcus may have been introduced from Halifax by home-coming convalescents of the 3rd Jamaica War Contingent.

Pellagra.—This is not a notifiable disease, but owing to a better knowledge of it, pellagra is being increasingly returned as a cause of death. Nineteen deaths were recorded from this cause.

Veneral Diseases.—These disorders are undoubtedly and increasingly prevalent. The high percentage of rejections of recruits for the Jamaica War Contingents on this score makes it evident that stringent measures are required to meet this peril.

No legislation will be adequate that does not provide for the segregation and systematic treatment of public women known to be infected, and in the case of men the special provisions of the Australian law might be modified to suit local conditions and requirements.

It seems necessary that there should be limited notification on the lines of the Western Australia law, with institutional treatment in suitable cases that cannot be trusted to continue private medical treatment and continence until perfectly cured.

It appears to me that if the vagrancy law was amended so as to give the police authorities extended powers in the direction of apprehending vagrants of both sexes and subjecting them to examination and when found necessary to segregation and medical treatment, a very definite advance would be made towards controlling venereal diseases among the mass of the people.

Apart from the prevalence of measles and influenza, pneumonia is the only other disease that might be said to have been unduly prevalent.

Infant Mortality.—There were 416 deaths of infants under 1 year giving a rate of 248 per 1,000 births. This is an increase on the high rate recorded for the previous year.

A number of ladies and gentlemen have recently formed themselves into a "Child-saving League," with the special object of initiating social measures to combat the conditions which give rise to the high infantile disease and mortality rates.

Out of a Government appropriation of £150, the Superintending Medical Officer has lately appointed two maternity nurses who are at the present time working under the direction of the Child Saving League. A number of prominent ladies with great energy and sacrifice of time are rendering voluntary aid, and it is hoped that great benefit will result.

The causes of the high rate of infantile mortality are well known in this country, 50 per cent. of the deaths may be said to be due to preventable causes, 30 per cent. being from such causes as premature birth, deficient vitality and infantile debility, 20 per

cent. from marasmus; no doubt the fundamental causes are the pauperized condition of the mothers due to precarious employment and a low rate of wages, together with the neglect of the fathers from a non-realization of the responsibility of parenthood.

Doubtless also vice leading to illegitimacy, constitutional disease in the parents, overcrowding and defective housing conditions the attributes of slum life, all serve to lower the vitality of the mothers and must inevitably react on the intra-uterine life of the infant.

Child saving has now become a matter of imperial significance as the present call for strong and healthy adults (men and women) to help in the various lines of national service in connection with the great war amply demonstrates.

The following remedial measures are, in my opinion, absolutely necessary:—

(1) The passing of a local Notification of Births Act on the lines of the English Act of 1915.

(2) The registration of midwives.

The practising midwives of the island have it in their power to be of the greatest practical use, not only in their daily routine work, but also in assisting to educate mothers in the essentials of mothercraft, therefore it appears advisable that midwives should be under greater control, and this could be effected by the passage of an Act regulating the practice of midwives.

The Birth-rate.—There were 1,671 births giving a rate of 28.1, this is a noticeable decline on previous years, and would probably be accounted for by the increased number of departures of healthy males as members of the various war contingents and as labourers to Cuba.

ST. ANDREW.

The general health of the parish has only been fair. Pneumonia has been prevalent throughout the year, especially during the last quarter.

Epidemics of measles, chicken-pox and whooping cough also occurred. The measles epidemic was of a severe type, with the frequent occurrence of complications. Influenza, also of a severe type, was prevalent during the year. Fewer cases of vomiting sickness than usual were heard of.

One hundred and sixty-seven cases of pulmonary tuberculosis were reported from the Union Poor House, the majority were Kingston inmates. As I stated in my last year's report the death-rate of St. Andrew is swelled by the deaths of Kingston inmates in the Union Poor House. The majority of persons admitted to the Poor House are incurable and eventually die there.

The sanitary conditions in the chief towns and villages continue fairly good. The slum districts are kept as sanitary as is possible considering the type of house and the lack of any provision for proper streets and drainage. The streets have been kept clean.

The water supply of Stony Hill as before is potentially dangerous. The rest of the parish is supplied by springs and rivers protected under law.

Pit closets are practically universal in the Liguanea district. The modern houses have w.c.'s and absorption pits.

There is a very slight increase in the death-rate compared with 1915-16.

The first portion of the year was very wet and damp. Rain fell almost every day. For the months of April to July the percentage of possible sunshine at Stony Hill was 40.2. The last quarter of the year was fairly dry. Malarial fever was fairly prevalent during the rainy season.

Measles, chicken-pox and whooping-cough were added to the list of notifiable diseases. Since October ninety-nine cases of measles were reported. One hundred and twenty-five cases of pneumonia were reported during the twelve months.

Veneral diseases are still fairly common. Gonorrhoea and soft chancre are most frequently met with.

I have seen five cases of pellagra in the Stony Hill Industrial School and I am informed that several cases have been treated in the Union Poor House.

LEWIS A. CROOKS, M.O.H.

ST. THOMAS.

The health of the parish has been very satisfactory, there has been prevalence of no particular disease with the exception of pneumonia and there has been an actual decrease in malarial fever as compared with former years.

There has been no complaint for insufficient water in any part of the parish during the year.

There has been marked improvement in the latrines of the town during the past year, many old ones have been abolished and the bucket system installed.

The number of premises disinfected on account of infective diseases is twenty-six.

There have been no marked changes in the meteorological conditions of the season; cases of pneumonia have been more marked during the rainy seasons.

Veneral diseases are fairly common in the parish; gonorrhoea more frequently met with.

F. A. NORTON, M.O.H.

PORTLAND.

The climatic conditions during the year were satisfactory except for the storm of August, 1916, which ruined the fruit business and threw so many out of work that the stress of hard times was severely felt, particularly in Port Antonio and its immediate surroundings.

The general health has been good. Malarial fever was prevalent in some districts but of a mild type.

There were the usual cases of measles, whooping-cough and mumps, but with no serious results.

The notifiable diseases show an increase over last year, 223 against 142 for 1915-16. There are far too many cases of enteric fever and pulmonary tuberculosis. The former is usually of a mild type, the latter usually runs a rather acute course.

The sanitary conditions prevailing in each town have been maintained in a satisfactory state.

The water supply of Port Antonio kept good until during the past six weeks when the green colour and offensive odour returned. Its use has given rise to no ill-effects, but some persons refuse to use it, preferring the polluted water of Orange River, although advised against its use.

The water supply of other towns has remained the same, that of Buff Bay being still unsatisfactory.

The public tanks are in good order and the public are now using the water.

Purveyors of Foodstuffs.

The examination of bakers, milkmen, milk vendors and other persons exposing for sale foodstuffs began in April, 1916.

5,946 persons have been examined; 589 of whom were refused certificates. There were on March 31, 1916, 1,054 persons on the register.

Of the 589 persons refused certificates: 310 suffered from venereal disease, 228 suffered from skin disease, 42 suffered from ulcers, 4 suffered from yaws, 5 suffered from tuberculosis.

These cases prove the necessity for the examination, which although not as complete as it should be, has certainly been very useful.

As the treatment of venereal disease is now so much discussed, I beg to submit for your consideration and recommendation to the Government that any law to deal with these diseases should have notification and compulsory treatment as two of its clauses. In small districts, even in towns the size of Port Antonio, the source of gonorrhoea can very frequently be traced to one individual.

I am sure that the majority of cases rejected by me for venereal diseases have had no treatment since rejection.

E. G. GROSSETT, M.O.H.

ST. MARY.

But for a rather extensive outbreak of measles towards the end of the period under review, the district enjoyed another year of freedom from epidemic diseases and the different seasons of the year were not attended by the prevalence of any particular disease. Even malaria did not show its usual seasonal incidence in the rainy months, and there was still a further drop in the admission of this disease to hospital, there being 237 admissions, as against 368, 364, 407 and 564 of the four preceding years. Enteric fever showed a slight increase, however—thirty-eight cases having been

notified with thirteen deaths. The majority (sixteen) came from Jack's River and the surrounding districts. Nearly all were treated in hospital and, with few exceptions, the disease was of a specially severe type. Five cases were sent in by other medical officers, and of the ten cases notified in Port Maria itself, four were proved to have been imported, all four occurring in the same house, among the same family, and at the same time.

The general mortality rate has been low. I do not think the meteorological conditions had any special influence in causing increased sickness or mortality rate.

Measles was the only disease which became epidemic during the year, and unfortunately it was of a rather severe type—a few cases of the hemorrhagic form, "Black Measles," coming under my notice. The epidemic was characterized by the large number of adults affected by its severity, and by its low mortality rate owing to the absence of pneumonia and other complications. It is impossible to state the number of persons attacked, but the disease was widely distributed throughout the district. Only two deaths directly attributable to measles were observed by me. The epidemic broke out soon after the three weeks' furlough given to the men of the War Contingent and the outbreak was doubtless attributable to them.

Dysentery was not generally prevalent in this district, but a small outbreak occurred in April and May, 1916, in the town of Oracabessa. It was short-lived but accounted for many deaths. It was of the amoebic variety.

G. I. LECESNE, M.O.H.

HIGHGATE.

There was no period of the year in which there was any particular disease prevalent. During the wet months there were a few cases of enteric fever not confined to any particular locality and in the majority of these cases the attacks were mild and ran normal courses. There were fewer cases of pneumonia than usual in early part of this year.

Sanitary Condition.—(1) Water supply.—(a) Source: There is no regular supply of water in this locality, the supply is usually springs and rivers, in a few cases tanks by private individuals and wells have been erected or dug. The quantity is quite adequate for the needs of the people. The water is on the whole pure; among the more intelligent, boiling of the water for drinking is being carried out. In the streams and springs there is every chance of pollution and these springs or rivers run for the most part through cultivations. In some cases, as in the valley of Richmond, there are residents on the banks of the river and there is bound to be pollution.

There is no particular season in which the death-rate varies to any appreciable extent. During the last winter there were a few deaths from the so-called vomiting sickness, which condition seems to prevail when things are hardest with the people, food being scarce and very little money available.

During the rainy seasons, October and March, malaria and enteric seem to be more prevalent. Other forms of gastric or enteric conditions also prevail most at those times.

Cases of enteric occur at all times of the year, not confined to any particular district and without any possibility of tracing the source.

Yaws is rampant and in many cases account for the large number of anæmic that are to be found. Gonorrhœa is also rampant as evidenced by the number of rejections in cases of recruits rejected for this disease.

There are a few cases of syphilis and an extremely large number of cases of gonorrhœa.

I have never met any cases of pellagra.

E. G. OSBORNE NIXON, M.O.H.

Gayle.

Malarial disease was par excellence the disease of the year. Cases cropped up throughout the year but the severe cases occurred mostly after the rainy seasons. The disease was of the high fever type this year. Measles and whooping-cough a long epidemic during the period November, 1916, to February, 1917. Several cases of broncho-pneumonia followed, a large number of which had no medical attendance but went to their graves having caught cold. Influenza was just becoming epidemic towards the close of the year. Pulmonary tuberculosis, pneumonia, pleurisy and other chest cases showed up more this year and last, especially in the cold season, December, 1916, to January, 1917.

As was the case after the 1915 hurricane, so in 1916, heavy worm infection followed, causing several deaths. Except in cases where the contrary was proved by post-mortem examination, these deaths were mostly attributed to vomiting sickness, ackee poisoning. Sixteen definite cases of this unfortunate affliction rather than disease came under my care. Of these four died before medical aid could be given, one despite this aid, and the rest recovered. It is unfortunate that very little can be done when the comatose stage is entered on.

Typhoid and dysentery were conspicuous by their absence.

Other diseases, without any particulars to note, helped to make a year's work interesting.

Water Supply.—Springs, rivers, rainfall collected in butts and ponds. Springs fairly good, but the fertile source of worm infection, some are too hard. Rain water good, except where collected in those disgusting ponds. Rivers the foulest source imaginable. Protection inadequate.

One public tank in process of erection at Gayle market.

Until certain springs are protected adequately, children will die of worms. It is so much more convenient for the natives of the village of Gayle, we will say, to wash clothes and do all their sundries at the lower unprotected spring and get their drinking water at the same time, than to have to go to protected spring for drinking water, after using the nearer spring for washing. They can be

prevented from washing where they drink, but not vice versa.

April, June, September and November rainy seasons always increased the malaria. Hurricane of August increased the number of gastric and intestinal cases. A cold spell in January, 1917, resulted in several chest cases, notably pneumonia.

Venereal Disease.—Gonorrhœa extremely common, soft chancres also; syphilis to a lesser extent. Only one case of pellagra seen.

W. I. ESCOFFERY, M.O.H.

ANNOTTO BAY.

During the year under review there has been a fair amount of sickness, especially among the poor and towards the end of 1916 and the early part of 1917 catarrhal pneumonia has been unusually prevalent as well as measles, which has occurred among all classes of the community.

The water supply for this town is derived from a spot called Coffee Piece, on Fort George property, five miles out of town. It consists of three out of five springs which burst out of a rock, close to each other; the elevation being such that a good and constant flow at full pressure is at all times maintained, both at the source and in the areas supplied. The water is of excellent quality and free from pollution by man or beast or decomposed vegetable matter. During the rainy seasons, however, the water is muddy and on being drawn at the taps is muddy (only in such seasons) and deposits a thick sediment in standing. There is no filter or filter bed to this supply, an improvement I would think urgently needed to prevent the menace to the health of the consumers when the rainy seasons are in—as now. There are no public tanks in this town of the parish; but outside the rails of the market there is a horse trough and within the market enclosure is a fountain which is never used and to which, for the convenience of the public, especially on market days, the pipe could be attached and so lessen the nuisance the country folks become to the householders when requiring water.

A regular latrine system is now inaugurated in this town within the limits of the town as defined by law. It consists of the bucket system on concrete or hardwood slabs, the backs provided with fly-proof shutters and in many instances tarred. The seats are in many instances covered with hinged traps which are raised when in use and closed after, and flushing out of these is done periodically. As many as can of the householders are erecting new places in accordance with plans given to them.

The rains have been evenly distributed save in the months of December, 1916—January, 1917, when the rainfall was heavy, but this did not materially affect the public health unduly or adversely.

There has been an unusual number of measles in the fall months, November, 1916, to the early part of March, 1917, but no epidemic.

Venereal diseases, I am sorry, are on the increase. The number of cases of true syphilis, chancroids and gonorrhœa that present for treatment is appalling. I had a suspected case, but the blood-test gave a negative reaction as done by the Acting Bacteriologist.

Peripheral neuritis is on the increase.

P. M. LYON, Acting M.O.H.

ST. ANN.

Dysentery was prevalent between September and January. The general character varied from mild to very severe. Measles also has been prevalent in different parts from December to March.

The mortality rate was increased between October and January caused by the outbreak of dysentery. The excessive rains of last year, particularly during the latter part of 1916, and other conditions contributed to the outbreak. Fully 450 persons were attacked, with about sixty deaths.

Venereal diseases are common in some sections of the districts, chiefly in the secondary and tertiary stages of syphilis.

W. E. WILSON, M.O.H.

CLAREMONT.

The water supply around Moneague is ample, also about Claremont, at present. In these villages the supply is from tanks, in the outlying parts from ponds. The tanks are protected by boards and wire meshing. There are nine public tanks in and around Moneague and four in Claremont.

Epidemics have caused an increased mortality. About 200 persons were known to have been infected, causing 30 deaths. The epidemics were measles and pertussis. There were a few cases of typhoid fever at various points. There were several cases of so-called vomiting sickness causing an increase in the death-rate. I also had five cases of actual ackee poisoning causing two deaths included above.

Venereal diseases are common, chiefly tertiary, secondary and primary syphilis; gonorrhœa is also prevalent.

I have had one case of pellagra which I treated and the patient recovered.

G. E. CHEYNE.

ST. ANN'S BAY.

The year under review has been an extraordinary one in consequence of the effects of the great war which is now being keenly felt here by the masses. On account of the rise in the price of foodstuffs and the shutting down of works of improvement, the people are apparently underfed and poorly clad, and thus become easy victims to various forms of diseases, as is instanced by the outbreak of dysentery, influenza, whooping-cough, measles and vomiting sickness—which especially is to be found among the poorer classes even in districts where ackees are not to be found.

Colonial Medical Reports.—No. 93. —Jamaica (continued).

It is regrettable to say that yaws is now prevalent in certain sections of this parish, especially at Lodge and Exchange, and if steps are not taken to stamp out this disease its effects will be far-reaching.

From January to March the death-rate was apparently highest owing to the heavy rains and an outbreak of dysentery. September to December there was an outbreak of whooping-cough in all the districts. In January to March there was a severe outbreak of measles among all ages.

The abnormal rainfall during a portion of the year under review without doubt adversely affected the health of the community. The month of January seemed to have been much colder than usual, and no preparation having been made for this many persons suffered from lung trouble.

Overcrowding exists to an alarming extent both in towns, villages and country parts.

Veneral diseases abound here. These diseases should be placed among the notifiable ones. All the varieties are equally common.

A. D. C. ROB, M.O.H.

TRELAWNY.

Intermittent malarial fever prevailed in the autumn of 1916. Whooping-cough prevalent all over the district in the summer and autumn, 1916. Malarial fever was of the usual type.

Water Supply.—Quantity unlimited. Martha Brae River supplies Falmouth, ponds and springs supply the country districts. Ponds and springs are liable to pollution in the country districts, from road washings, cattle, &c.

Quite a few cases of death occurred in elderly sickly people throughout the district, death being accelerated by insufficient and improper food.

Heavy rains during 1916, more so in the late fall, made an increase in the incidence of malaria.

Whooping-cough was throughout the whole district in the summer and autumn.

G. P. CAMPBELL, M.O.H.

ULSTER SPRING.

There were several cases of mumps during May and June and pseudo-influenza, other than these no particular disease can be said to have prevailed during the different seasons of the year.

The chief water supply for the bigger villages is from springs and is abundant. It is pure and two are protected.

No provision has yet been made for the disposal of night soil and latrines have to be moved when filled.

Veneral diseases are common, particularly gonorrhoea.

EYRE SMITH, M.O.H.

DUNCANS.

With the exception of a rather widespread outbreak of mumps during the months of April—June, there was no special sickness during 1916. The last quarter of the year saw the usual outbreak of the vomiting sickness. This was specially severe in certain villages and caused the death of about 25 persons, mostly children.

Water supply chiefly from ponds—part of Stewart Town is supplied by the Rio Bueno River. Plentiful during rain weather—very scarce during droughts and contaminated in nearly all cases.

An outbreak of mumps lasted several months. The epidemic of vomiting sickness lasted (in its bad form) a few weeks.

Overcrowding exists everywhere and it is impossible in most cases for any other condition to exist in view of the means of the people.

Veneral disease is common—especially gonorrhoea.

F. A. G. PURCHAS, D.M.O.

St. JAMES.

Eight typhoid fever cases were notified during the year; only three of these cases originated in the town of Montego Bay, one from the Adelphi district, one from the Orange district, two from St. Elizabeth, and one from Hanover. All were of the severe type, hyperpyrexia and intestinal hæmorrhage being marked. There were two deaths.

Eight acute lobar pneumonia cases were notified in February and March, 1917, with one death. These cases were all of a severe type and were the result of an infection from the Contingent Camp at Kingston. Members of the Contingent who had run the risk of infection or had already contracted the disease were indiscriminately let loose over the country and so spread the disease.

Twenty-three cases of pulmonary tuberculosis were seen with six deaths. This number I am quite certain should be added to. This disease is very much on the increase.

Malarial fever was very common during the year, especially during the last months of 1916; mostly of the bilious remittent type. Only one case of the hæmoglobinuria or blackwater fever was seen, the year previous there were over a dozen cases of this variety.

Syphilis is very prevalent and increasing—most cases are of the chronic or so-called tertiary type, where there is very little hope of cure by any treatment—very few cases are seen in the secondary or primary stages.

Gonorrhoea and chancrels with their complications are very prevalent and are increasing. These cases also are seldom seen at the beginning; only when severe complications arise and the victims are alarmed at pain or other impending conditions do they seek medical aid.

The sanitary conditions are being gradually improved but there still remains much to be done.

The water supply of Montego Bay has been good; there has been a good supply of water as to quantity and the service has been well maintained. The analysis of the water has been fair, but there are still traces of contamination which evidently is introduced through the hydrants in the town. These hydrants should all be elevated above the level of the ground.

The water supply of the country districts and villages is obtained from springs and ponds and is under the protection of the Parochial Board, but in the majority of cases is not fit to drink unless boiled.

Latrines.—Chiefly of the pit system. There are about eighty sanitary latrines in Montego Bay with absorption pits—these work very well and are being installed whenever possible. As far as possible all the town latrines are protected from flies. In the country parts the latrines for the most part are very primitive and are not fly or animal proof.

I gave a demonstration to a large number of persons in one of the country districts how to construct a sanitary latrine and to keep it sanitary at practically no cost except the individual labour, but my talk evidently fell on deaf ears, as I have seen no results.

During the last months of 1916 the mortality rate was increased slightly, owing to the increased prevalence of malarial fever.

During the greater part of the year under review there was an abundance of rain. In consequence there was more general sickness; no epidemic but a general complaining of not feeling well—colds, &c.

The only outbreak of an infective disease was that of pneumonia.

Overcrowding still exists to a great extent, but more so in the country parts. No attempt has been made to improve this unsatisfactory condition except to bring it to the notice of the parties concerned.

Veneral diseases are very common. All varieties are common, but especially syphilis and gonorrhœa.

Yaws is very prevalent in this parish. During the year under review at the instance of the Government I treated 248 cases with injections of one of the salvarsan preparations of English and French make with a rapid disappearance of all symptoms, and as far as I could judge 248 cases cured. As soon as those afflicted saw the effects of this treatment they began to come to me by the dozens and to beg for injections, so at my request the Parochial Board kindly obtained 100 ampoules with which I treated and cured 128 more of these unfortunate and afflicted beings, the majority of them being under the age of 14 years; many of them infants under 4 years. I understand that the Parochial Board is so gratified by the result of this experiment that they intend to continue the good work and have ordered a further supply for the coming year.

There is no question that these injections of the salvarsan preparations are doing a great deal of good, and that the people are quite alive to the

advantages of the treatment. Whenever I go in the district I am approached by persons asking for treatment and their disappointment is very keen when I have to refuse for want of the drug. I could easily treat twice as many cases as my supply of ampoules call for. The comparative immunity from typhoid fever in this parish during the last two years is, in my opinion, due to the prompt action taken by the Board to endeavour to stamp out this disease which was rampant four and five years ago and was increasing year by year.

Besides seeing that all my instructions as regards disinfection and isolation were strictly enforced, the Board imported antityphoid and paratyphoid vaccines, so that I could inoculate all subjects. The use of this vaccine during the last three years has in my opinion helped considerably to prevent the spread of typhoid fever.

Geo. Wm. Thompson, M.O.H.

HANOVER.

Malarial fever of the intermittent type was prevalent in February and March, 1917, also from May to August, 1916, particularly in the Mount Peace district. There were also a few cases of the bilious remittent type.

An outbreak of diarrhœa occurred in the Sandy Bay district during the months of May and June, 1916, due to polluted drinking water obtained from the Blue Hole River.

The town of Lucea is supplied with water from a large reservoir a few miles from the town. The other towns and villages are supplied by springs, rivers and wells. Whenever the reservoir is in good working order the supply is constant and plentiful. The quantity of the water is, in most cases, practically pure but liable to pollution where there is no covering over the source of supply.

With the exception of outbreaks of malarial fever and diarrhœa, there were no outbreaks of infectious diseases.

Overcrowding still exists, but not to an alarming extent.

A. J. Salmon, M.O.H.

WESTMORELAND.

There has been the usual amount of malarial fever with an occasional case of the malignant type. There has been an epidemic of influenza between the months of November, 1916, and March, 1917; pneumonia was a complication in two cases, both of which recovered.

Colitis or dysentery has been manifest in all sections and cases still keep coming in. The epidemic started in November, 1916, and still persists; as far as I know no deaths have resulted and the disease has been of a mild type, especially compared with that of 1912, which was of a very severe nature.

One case of enteric fever was reported in my district and I reported two others; on submission of the blood of each of these patients a negative Widal reaction was returned and therefore I do not include them in this category.

The sanitary conditions in the chief villages is good, malaria alone being the principal ailment.

The water supply is entirely got from wells. In wet weather it is ample, in the dry season most of the wells run dry and much difficulty is experienced. It is liable to pollution in many cases due to surface drainage.

Very few wells are protected, those that are protected have a small mason work wall around which prevents washings after heavy rains from entering.

Bakeries and bakers have been inspected and the bakehouses whitewashed. Milk is tested and the vendors and milkers have been inspected.

The open tray method of selling bread and cakes has in every instance been superseded by the wooden and glass case which is kept clean and is a step in the right direction.

Influenza claimed pretty well every inhabitant in and out of my district.

Colitis of a mild type has been seen in this and surrounding districts. I should place the number of infected persons at 100. The disease is most probably spread by the medium of flies, on account of the bad latrine arrangements.

Veneral diseases are fairly common in my district, a few come under my care and observation. Tertiary syphilis and gonorrhœa are most met with.

S. A. ISAACS, M.O.H.

BETHEL TOWN.

The year under review has been an exceedingly healthy one, in fact, this district is a very healthy one all round. Two cases of infectious diseases were reported for the year, one a case of enteric fever and the other a case of acute pneumonia. There was one case of erysipias, and a few cases of malarial fever.

During the months of December and January, just after the heavy rains had ceased, there were a few cases of undetermined fever.

The water supply of the chief towns and villages are by means of ponds and lakes. The poorer classes take their water from the ponds, while the better classes have tanks. The quantity is practically always plentiful. The ponds are unprotected and always liable to pollution at any time.

Overcrowding exists in all parts of the district and the people are warned against the dangers resulting from such a condition.

There has been one case of syphilis (tertiary) and several cases of gonorrhœa. The people only come for treatment in the late stages or when complications have set in. I am of the opinion that there are plenty cases of it which never come to a doctor for treatment at all.

R. G. SHERLOCK, M.O.H.

ST. ELIZABETH.

Following the hurricane and heavy rains which fell during the summer months and autumn of last year, there was a marked prevalence of malarial fever in the town of Black River and throughout the low-lying districts, which do not lend themselves easily to surface drainage.

I have seen several cases of blackwater fever in the Burnt Savannah district which lies in close proximity to the swamp lands—a few cases proving fatal.

This condition I fear will always exist until some remedial measures are taken to deal with the morass areas which cover upwards of 5,000 acres of lands.

The infantile mortality in these districts must necessarily be high, and the struggle to rear healthy children in these districts is correspondingly great.

The Pedro Plains district also contributed its quota of fever cases owing to the difficulty of drainage.

Enteric fever is on the decline.

Twenty-one cases of phthisis were reported during the financial year under review as against thirteen cases for the previous year.

The water supply in the town of Black River continues good. This is brought down by pipes for a distance of ten miles, from the "Y.S." falls, and distributed from house to house. A sufficient quantity is always available.

There are seven public tanks situated in the Southfield district. These tanks continue to be a source of great utility to the district. They are opened to the general public during the dry season of the year, and from the large number of persons who receive their supply from them testify to the foresight in their erection. In the Malvern and New Market districts the water supply is obtained from private tanks, which is healthy and supplied with proper catchments. In Balaclava and Siloah, besides private tanks water is taken from the river, and severe outbreak of intestinal disorders took place in these two villages, many cases proved fatal. I submitted samples of the water taken from the river to the Government Bacteriologist, who pronounced it as being highly charged with impurities, chiefly of faecal origin. In many instances the catchments attached to private tanks are used as playgrounds for children, pigs and goats. I hardly need say how far this goes to propagate diseases.

Latrines exist in the homes of the more intelligent, but among the very poor in the remote country districts none, or very few exist, the excreta being deposited in near-by clumps of overgrown weeds or fields, and these lend themselves to denredatory birds and beasts.

The villages and township are easily self-drained.

Mosquitoes.—The people for the most part have grasped the idea of destroying empty tins, coconut cups, shells and other receptacles which would encourage the breeding of mosquitoes. In like manner the compounds adjoining their homes are kept free of rank weeds.

There has been a widespread epidemic of measles, which has run its regular course. I am not aware of any deaths as a result.

Yaws.—The Government have resumed the treatment of a certain number of cases. Those under my observation have all yielded successfully to treatment with kharsivan.

The Parochial Board has also successfully treated eighty-five cases with the same material, as well as with mercury, arsenic and iodide of potassium. Much more, or rather, I would say, a more determined effort is necessary if a permanent stamping out of this disease is to be had. Yaws is certainly on the increase in this parish.

Pellagra.—Three cases occurred at the Manning Home but all have yielded to treatment.

Syphilis is met with more often than would be imagined. The secondary and tertiary manifestations of the lesion are those most commonly seen; the primary lesion is also common. Many more cases of the latter would be seen but from the fact that home treatment and unqualified helps play a great part in this malady during the early stages. Miscarriages are very often the result; chronic ulcers also contribute in no uncertain manner to a high infantile mortality.

Gonorrhœa is prevalent with complications such as buboes, orethritis and ophthalmia.

R. M. STIMPSON, M.O.H.

MANCHESTER.

The health of the parish, although the mortality rate was not abnormal, was very unsatisfactory through the prevalence of sickness throughout the year. There were epidemics of measles, chicken-pox, whooping-cough, malarial fever, enteric and ulcers.

Measles, chicken-pox and whooping-cough assumed epidemic proportions during the year 1916.

A severe outbreak of enteric occurred in the districts around Greenmont during the months of October, November and December. The infection was introduced into the district by a wandering girl and the spread of the disease was rapid, but was confined to eight houses.

Malaria was prevalent in the districts extending from Downs to Alligator Pond during July, 1916, after the unusual heavy rains. In 1917 this fever broke out in Harmon's, where a considerable area of the district was flooded through the rising of subterranean springs. The isolated pools formed by the receding of the water afforded suitable breeding places for mosquitoes, fever became prevalent and the situation was met with appropriate measures.

Specific and traumatic ulcers caused great suffering throughout the parish, and I regret to state that these ulcers continue to give a deal of trouble to the people who will employ very drastic remedies.

The sanitary condition of Christiana remains unsatisfactory. The springs are liable to pollution from the dirty surface latrines.

The reservoirs at Battersea furnish a good supply of pure water to Mandeville.

Except in the northern districts, where there are springs and rivers, the rain water is collected in tanks and ponds, but the catchment areas, which are enclosed with barbed wire, are open to some form of pollution, except in the case of the parish tanks.

Mandeville.—The bucket system with the use of dry red earth is in general use and has so far worked satisfactorily.

After the unusual heavy rains malarial fever was prevalent, but not of a severe type.

Enteric fever was introduced by a wandering girl and the spread of the trouble was aided by personal contact, nursing and inquisitive visits to the infected house.

Fourteen cases of pulmonary tuberculosis were reported during the year.

Hookworm is prevalent throughout the parish.

Overcrowding exists in the villages and districts.

Veneral diseases are not uncommon in this parish. Syphilis and gonorrhœa are very noticeable.

M. M. MEKLE, M.O.H.

CLARENDON.

The health of the district for the period under review was good, there were no epidemics and no unusual mortality; mild cases of malarial fever appeared during the year, but showed no marked preference for any particular season.

The water supply is obtained from the Rio Minho, the intake being about six miles from the town of May Pen. The quantity is variable. During the dry season the householders at the higher level of the town suffer from insufficiency of water for the following reasons: The taking of water by the railway engines at all hours during the day and night; the frequent breakages which occur from time to time due to old and worn-out mainpipes, the pipes are frequently choked with debris and other matter. I would strongly recommend that a new water supply be laid down to put an end to this constant cutting off of the water supply.

The water is not protected in any way from pollution and may be polluted by anything that may be thrown in the river above the intake; as there is no filtration it may be polluted from dirt, debris and other vegetable matter due to the frequent breakages which occur. The better-class of the inhabitants boil their water, but there is great difficulty in getting the ordinary class to do so, and as a result they suffer from intestinal diseases.

In the town of May Pen there are 103 premises without a latrine. All surface latrines are accessible to flies and fowls.

The rainy seasons were fairly continuous from August until November, followed by a short period of drought during December and January, and during this period malarial cases of a mild type were met with.

Four cases of measles came under my notice. Three cases of enteric fever and four cases of pulmonary tuberculosis, with two deaths from the latter disease.

A. G. McKENLEY.

Colonial Medical Reports.—No. 93.—Jamaica (continued).

RACE COURSE.

CHAPELTON.

Measles and mumps appeared in epidemic form in the district; both adults and children were attacked. In the few cases of measles seen the type was severe. The principal complication was broncho-pneumonia, which was the condition for which treatment was sought. As sequelæ a case of gangrene of the ear and cheek was seen and a case of paraplegia, the former in a young child who died, the latter in a young adult male who completely recovered.

There were no sanitary improvements carried out during the year. The water supplies continue to be derived from the same sources mentioned previously, and the disposal of waste is carried on as previously recorded.

It has not been possible to obtain any improvement in the direction of each premises being provided with satisfactory latrine accommodation.

Venereal diseases exist in this sanitary district and gonorrhœa is commonest.

A. W. THOMSON.

CROFTS HILL.

Sickness does not prevail with any marked difference during the different seasons of the year, and the diseases generally do not assume a severe character.

The water supply of the villages in this district is entirely derived from springs and rivers, except in two cases where rain water is stored in iron tanks by the residents, and even here resource has to be made to springs in dry weather. The quantity available is always ample.

The purity is questionable, especially in cases of the rivers and in those springs where the water is taken some distance from the source. Pollution occurs from washing of clothes and by persons and animals fording the streams. One stream is protected, that is, it has been proclaimed to be a protected stream within the law, and arrangements are being made to have notice boards put up along the banks calling the attention of persons to this fact.

Where latrines exist not any are fly-proof, except in the cases of the bucket system, where earth and disinfectant are used.

H. T. STRUDWICK, M.O.H.

SPALDINGS.

The sanitary conditions prevailing within my district are good.

Source of water supply is from catchments and shallow stream; quantity available limited in dry weather; not liable to pollution; protected by being kept in iron tanks and cemented cisterns.

A few cases of measles occurred, due presumably to increased moisture at night.

Overcrowding does not exist.

GERALD J. S. TAIT, M.O.H.

Malarial fever showed an increase amongst the indentured immigrants, especially the last shipment of coolies suffered from its effects. Creole labourers from the Vere Immigration Water Works suffered from the pernicious type.

Neuritis was especially rife amongst the poorer classes and ill-nourished; the number of cases met with being 20; number of deaths 4. This was probably due to malaria and syphilis.

The water supply in most of the districts has been good, but in many cases the wells need protection. As to purity, in many cases are liable to pollution.

Overcrowding exists in the villages and country parts.

Venereal diseases are common in my district—gonorrhœa and syphilis.

J. H. CLARKE, Acting D.M.O.

ST. CATHERINE.

The health of the district for the year has been fair; a month or two before the close of the year a very serious form of stomatitis broke out in different parts of the district, and at time of writing shows no sign of lessening.

Pneumonia and measles have been very prevalent during the last quarter of the year, now considerably less.

Yaws too, I regret to state, is on the increase and in many of the outlying districts is spreading at an alarming rate, and although this matter has been brought to the notice of the Board with a suggested form of treatment by me, as is done by many of the Boards throughout the island, I am not aware of any step being taken in the matter; meanwhile the children, and even adults, of the district are in a very bad state, and I am afraid the only school in the district will soon close its doors if something is not done at once to stay its ravages.

There is no improvement in the water supply since my last annual report, and I am afraid never will be, as far as quantity is concerned, until new and larger mains are laid down. (The town, it may be said, at present is bigger than its supply.)

Latrines.—The pit system is the one in general use in the town. The public buildings and a few private individuals use the dry earth bucket system.

There is a water carriage system in connection with the Public Hospital and District Prison; whilst an absorption pit is at the railway station and Rio Cobre Hotel.

Housing of Labouring Class.—The improvement noted in my last annual report has not continued, I regret to say, outside of Spanish Town proper, which is fairly good. The out of town housing is still very bad, and in the estate districts of Caymanas, White Mall and Turnbull Pen is deplorable.

Malaria.—The local conditions encouraging the life and growth of the anopheline are sought out and remedial measures employed with fairly satisfactory results. Better cannot be obtained until

funds will allow of the clearing, say, for two or three miles away from the town, of all bush, &c., leaving nothing under which the mosquito could find shelter.

Of the 150 cases of notifiable diseases reported from this district during the year at least half a dozen of those reported as typhoid were never proven, and although I made repeated applications in writing for a verification, up to the time of writing the information has not been received. This is most regrettable.

Apart from the above a very severe form of stomatitis, involving not only the buccal mucous membrane, tongue, hard and soft palates, but the conjunctivæ and eyelids, accompanied by severe and somewhat obscure nervous symptoms, in most cases simulating peripheral neuritis, and even myelitis was observed some time in December last and reported. The Government has since made it a notifiable disease, and the Parochial Board have taken steps for isolation and treatment of the worst cases.

J. J. EDWARDS, Acting M.O.H.

LINSTEAD.

There have been numerous cases of malarial fever of a mild character. Pneumonia and typhoid fever have also been very prevalent.

The sanitary condition is good.

Water Supply.—Linstead is supplied from the cistern gully, which is about seven miles above, and there is a house-to-house pipe supply. The other districts are supplied by springs and rivers in abundance.

Linstead supply was analysed and bacteriologically advised that water should be boiled for drinking; supply of other villages questionable as regards purity. All streams are protected by law. One at Mount Rosser is covered and water is drawn by a tap.

There have been heavy rains during the earlier and middle part of the year and in consequence there have been many cases of malarial fever. At the fall of the year there was a sharp spell of cold weather, which probably was in a measure accountable for the unprecedented number of cases of pneumonia. Apart from the last-named disease there has been no other outbreak of infective diseases except measles, which is not notifiable in this parish.

Overcrowding does not in my opinion exist in the country parts, but it undoubtedly does in the villages and principal towns.

J. H. ABRAHAMS, M.O.H.

ST. DOROTHY.

Malarial fever has been much more prevalent than usual during the period under review; owing to the greatly increased rainfall the disease has generally been of a mild type. Influenza has also been common and principally of the gastric variety, especially during the months of January, February and March.

The sanitary condition of the town of Old Harbourn, the villages of Old Harbourn Bay and Pot House, and the districts of Church Pen and Bartons has been satisfactory.

The water supply of the town of Old Harbourn, the village of Old Harbourn Bay, and the district of Church Pen is derived from a dam at Bartons and a reservoir at Colbeck. The water at Pot House is principally supplied from inexhaustible springs at Spring Garden. The district of Bartons also has an inexhaustible spring even in the driest seasons. The quantity is ample in times of ordinary rainfall, but there is no means of obtaining the exact amount. The purity of the above sources is absolute and there is no possibility of pollution.

In the case of Old Harbourn, Old Harbourn Bay, Church Pen and Pot House, the water is conveyed in iron pipes from its source to its distribution. The spring at Bartons flows directly into a covered tank from which the water is obtained by means of taps.

The *relative mortality* is very low at all periods of the year, but somewhat higher during the rainy season and colder months.

Owing to the greatly increased rainfall malarial fever has been much more prevalent this year than at any previous period during the past eight years.

Influenza is more common during the colder months, and appears to be due to the high chilly winds then prevailing.

Six cases of pneumonia occurred, five of them being secondary to influenza. Four cases of pulmonary tuberculosis were seen, the disease being imported into the district.

One case of typhoid fever was treated and made a good recovery.

Influenza has again been very prevalent during the year. The total number of cases under treatment was 267, the disease being principally of the gastric type.

Venereal diseases are fairly common in this district. Tertiary syphilis is the form most commonly met with.

F. O. SIMPSON.

Colonial Medical Reports.—No. 94.—Makogai.

MEDICAL REPORT ON THE TREATMENT OF LEPROSY.

By F. HALL,

Medical Superintendent, Leper Asylum, Makogai.

SOME COMMENTS ON DRUGS AND VACCINE THERAPY IN THE TREATMENT OF LEPROSY.

THERE have appeared recently, in at least one medical publication, and also in a Colonial medical report, some results of the treatment of leprosy by intramuscular injections of chaulmoogra and camphorated oils with resorcin, which are, to say the least of them, sanguine. In one paper such observations as "sensation completely restored" are made after three months' treatment; no case in this paper appears to have been treated for a year. In the report under this heading "good results" are claimed after as few as three injections. Dr. V. G. Heiser, who made the first important report on this form of treatment, was most guarded and more modest in his claims for it, but his first series of cases was, I believe, quite small, twelve in all, far too small for statistical results to be of much value. Dr. Heiser, in his only publication I have seen of this treatment, stated that a further series of cases was undergoing it. I have not heard the result. As all workers amongst lepers will admit, remission of the disease and even apparent cures are not uncommon under no specific treatment, and in a disease of such chronicity and such profound infection it is ridiculous to record the results of treatment after three or four intramuscular injections of chaulmoogra oil. Again, in cases of advanced leprosy any agent that would destroy the infecting organism with this rapidity would assuredly destroy the patient by the quantity of toxins thrown into the circulation. All therapeutic agents that promote "reaction" should be used with extreme caution, and I would even be suspicious of destroying large numbers of leper organisms *in situ* by such agents as X-rays and carbonic acid snow for the same reasons. The aim of our treatment should probably be, until a specific remedy is discovered:—

- (1) To diminish leprotic "reaction."
 - (2) To increase the general resisting powers of the body.
 - (3) To immunize the body by a gentle flow of antibodies from the infecting organism.
- To promote these factors:—
- (1) Chaulmoogra oil especially administered, as it was by Heiser in the Philippines.
 - (2) Good food, cleanliness, and strict observation of the rules of hygiene, an ordered life.
 - (3) Moderate work in the open air to promote the circulation of immunizing bodies from the infecting foci, and to promote the absorption of the injected oils.
- After two and a half years' treatment by the

intramuscular injection of chaulmoogra oil and effort to observe the other lines of treatment as mentioned in (2) and (3) above, from observation of some ninety cases, I think nothing dramatic must be expected after a few injections, and unless patient and physician are determined to persevere in it for a very long time "cure" should not be expected, though there is little doubt that the treatment is of great help to the leper, and be may at least confidently look forward to:—

(1) Losing or greatly reducing the frequency of attacks of leprotic fever, and including leprotic "reaction."

(2) Improvement in general health and energy, provided of course there is no intercurrent disease preventing it, or his organs of elimination are not too damaged to allow improvement.

(3) Some return of tactile sensation and reduced liability to traumatic ulcerations.

(4) Arrest of the disease, in a proportion of cases. Trophic ulcers do not heal under its influence, and should always be treated surgically by the free removal of underlying bone, which is always affected.

Sensation does not readily return to patches and areas where nerves are more or less destroyed, but patients do not burn and otherwise injure their hands as they formerly did before this treatment.

The ill-effects are negligible. It does not cause "reaction" and dissemination of the disease like vaccines and such drugs as iodide of potassium.

Two out of the ninety patients could not tolerate 5 c.c. twice a week, getting headaches and malaise; but improved on 5 c.c. once a week. One patient fainted. Some few did not absorb well, and oil was found *in situ* weeks after; exercise promotes its absorption.

There have been some cases of coughing, as a minute quantity gets into a vein; but if the needle is introduced separated from syringe, and only coupled after there is seen to be no bleeding from it, the injection of the oil is safe.

In the thousands of injections there have been three abscesses. At the end of this report I attach notes of seventeen cases taken more or less at random from the ninety treated.

It is here appropriate to record our experience of reaction-producing vaccine, which we were supplied with in sufficient quantities to make a proper test. This vaccine is prepared in a famous laboratory from an acid-fast phase of a streptothrix, said to be grown from leprosy tissue. Under the microscope the deposit found in many of the tubes shows an acid-fast amorphous mass. Thirty lepers accepted the treatment at the beginning, and some persevered in it for fourteen months, when it was

discontinued as no amelioration of the disease could be ascribed to this treatment, and in some cases violent reaction was provoked, which was clearly injurious to the patients. All except three or four got some reaction, and no patient was anxious to continue the treatment. Seven of the (thirty) patients have since died of tubercular complications of leprosy. Two have active tuberculosis; one is probably tubercular. The above results make one suspicious that the vaccine is analogous to tuberculin, and is as dangerous a therapeutic agent.

Note.—A very large number of all Fijians, including lepers, have a tubercular focus active or inactive. Out of 224 Fijians, general population, tested by Dr. Harper of this service by Von Pirquet's method, 62.5 per cent. gave a positive reaction. Out of 121 lepers I tested by the same method 65.5 per cent. gave a positive reaction. As I had no young lepers to test my results were practically identical with Dr. Harper's, as his positive percentage under five years was 22.7.

Whatever the analogy is between leprosy and tuberculosis, it is certain that treatment which lights up the foci of disease is equally harmful to both. Many writers encourage the view that the production of "reaction in leprosy is desirable"; all our clinical observations here are against this thesis. The very low local toxicity of the leper organism makes leprosy a very slowly self-curative disease, the organism when partially occluded by the active resisting powers of the body slowly pour out their antigens without causing any vital local destruction, and if the excreting organs of the body are capable of getting rid of the toxic products of the organism an immunity is built up against further invasion, the organisms die out, and a cure results. "Reactions" caused by vaccines or drugs, e.g., iodide of potassium, upset all this balance, and "lighting up" the foci disseminate the organism. This is clinically frequently manifest. A leper with a few localized nodules gets a "reaction," and in a day or two he may be covered with nodules which on section are found to be swarming with acid-fast organisms, and the bacilli may during the reaction be found in the blood.

The cure of leprosy is, of course, rare; the infection becomes so profound, the resisting powers of the body to other disease so lowered, that the patient is carried off by one of them; but I believe that the chaulmoogra oil treatment in conjunction with the active co-operation of the patient is based on the right principles, but requires perseverance consonant with the degree of infection.

Notes of seventeen cases taken more or less at random from the ninety cases treated:—

Case 1.—Vetere, male, aged 30:—

A.—*Condition before treatment.*—Nodular leprosy, ears, face extremities; loss of eyebrows; frequent attacks of leprotic fever; traumatic ulcers of hands; no energy, slept badly; nares, acid-fast organisms present.

B.—*Duration of treatment.*—Two and a half years; twenty-two months chaulmoogra c. camphor oils only; eight months ditto with resorcin.

C.—*Treatment.*—Five c.c. once weekly; four c.c. twice weekly for eight months; worked well and observed the other rules of treatment.

D.—*Good effects.*—Nodules have disappeared, though face still looks lumpy; has some eyebrows; does not get leprotic fever; does not get traumatic ulcers of hand, says he feels things in his hands better; feels better, sleeps well; acids-fast still present in nares.

E.—*Ill effects.*—Nil.

Case 2.—Simione, aged 55:—

A.—Advanced nodular leprosy; "Facies leonina"; hands and feet swollen with leprous infiltration, skin of extremities tense and shiny; frequent attacks of leprotic reaction; weak and ill; nares, acid-fast organisms present.

B. C. and *E* as in Case 1.

D.—Nodules and infiltration of face have disappeared, the only trace of nodule left in lobule of ear on incision and scraping showed much cell detritus, no properly staining cells, and an amorphous mass staining faintly acid-fast, no bacilli; skin loose and flaccid where nodules originally distended it; infiltration of hands and feet disappeared; does not get leprotic fever; eyebrows are growing; feels well and works well; no acid-fast organisms nares.

Case 2a to contrast with above, Indian woman, aged 50:—

A.—"Facies leonina" not so well marked as Case 2; hands and feet swollen, skin tense and shiny; traumatic ulcers of hands; sores on feet; many acid-fast organisms nares.

B.—Treated only by chaulmoogra oil by mouth for two and a half years.

D.—*Condition after this treatment.*—Nodules have disappeared from face; eyebrows still very scanty; still gets leprotic fever; gets traumatic ulcers of hands; many acid-fast organisms nares.

Case 3.—Jossia, male, aged 43:—

A.—"Café au lait" patches slightly infiltrated in which there is dulled sensation to heat and cold and tactile sensation; some loss of eyebrows; some infiltration of skin of eyebrows; attacks of fever and malaise; no acid-fast found in nares.

B and *C*, as in Case A, but irregularly as he did not absorb it well.

D.—Patches have disappeared, but sensation is not normal; attacks of fever fewer, but gets filarial fever; feels better.

E.—Nil.

Case 4.—Filimone, male, aged 35:—

A.—"Main en griffe" with wasting; traumatic ulcerations of fingers; sensation in ulnar area dull; ulnar nerve irregularly thickened above elbow; facial paresis; gets attacks of fever; "café au lait" very faint patch on face; nares, acid-fast organisms not found.

B. C. and *E* as in Case 1.

D.—Does not get traumatic ulcers; does not get fever; patch has disappeared; greatly improved in general health; nares still negative.

Colonial Medical Reports.—No. 94. —Mak gai (continued).

Case 5.—Vani, female, aged 17:—

A.—“Main en griffe” with wasting and traumatic ulcerations; large “café au lait” patches; thermanæsthetic and anæsthetic face and trunk; nares, acid-fast organism negative.

B and C, as in Case 1.

D.—Patches have almost disappeared though sensation is not normal; says the power of feeling in hands has greatly improved; works hard, cooking, ironing, &c., and does not get traumatic ulceration; nares still negative.

E.—Fainted; does not always absorb her injection well.

Case 6.—Samuela, male, aged 32:—

A.—Early nodules ale nasi, lobes of ears; ulcer of finger; feet puffy; gets leprotic fever; nares, acid-fast organism present.

B, C and E, as in Case 1.

D.—Nodules less, still present; no traumatic ulcers; no leprotic fever; swelling of feet has gone down; still has acid-fast organisms in nares.

Case 7.—Serima, female, aged 30:—

A.—Patches, thermanæsthetic and anæsthetic; ulnar nerves above elbows irregularly thickened; traumatic ulcers, hands and feet; leprotic fever.

B, C, and E, as in Case 1.

D.—Patches almost disappeared; sensation improved; does not get traumatic ulcers though works at washing and cooking; general health excellent; does not get leprotic fever.

Case 8.—Sekoveti, female, aged 30:—

A.—“Café au lait” patches, sensation dull in these areas; deep perforating ulcers of both feet; traumatic ulcers of hands; thickening skin of knees and elbows; leprotic fever.

B.—One year.

C.—6 c.c. once weekly.

D.—One perforating ulcer of foot healed, it was operated on and metatarsal bone removed; ulcer on other foot not healed; traumatic ulcers of hands healed and does not get fresh ulcers; in excellent general health and works hard ironing and cooking; patches have disappeared; sensation improved; less thickening of skin of knees and elbows.

Case 9.—Emeli, female, aged 17:—

A.—“Café au lait” patches, anæsthetic and thermanæsthetic; traumatic ulcers on hands; leprotic fever.

B.—Started two and a half years ago, but stopped as she was getting thin and tubercle was suspected; started again six months ago.

D.—Has greatly improved in condition and general health during past six months; patches much less distinct, sensation still dull; does not get traumatic ulcers of hands; no acid-fast organisms nares.

Case 10.—Macu, male, aged 10:—

A.—“Main en griffe”; “café au lait” patches; traumatic ulcers, hands and feet; drop foot; very poor condition; gets fever.

B.—Fourteen months.

D.—Greatly improved in general condition;

patches have faded; sensation not improved; does not get traumatic ulcers as readily as he did, or leprotic fever; weight, January, 1917, 78 lb.; weight, January, 1918, 98½ lb.

Case 11.—Tomu, male, aged 28:—

A.—“Main en griffe”; “café au lait” patches, sensation dull; gets leprotic fever; nares, acid-fast organisms negative.

B, C, and E, as in Case 1.

D.—Patches faded, but sensation in them still dull; says he can feel things gripped in his hand much better; does not get traumatic ulcers; does not get leprotic fever, very energetic and greatly improved in condition.

Case 12.—Apimeliki, male, aged 20:—

A.—Nodules in ears, face puffy; gets leprotic fever; gets traumatic ulcers; no strength or energy; patches in which sensation is dull; acid-fast organisms in nares.

B.—One year and nine months.

D.—Nodules in ears have not progressed; does not get leprotic fever; does not get traumatic ulcers; says sensation in hands is returning; patches faded, but sensation still dull; acid-fast organisms in nares are granular, and do not stain well.

Case 13.—Jimi, aged 60:—

A.—Nodules face, ears, hands, and feet, latter swollen; skin shiny; leprotic fever; loss of eyebrows; many acid-fast organisms nares; no energy.

B.—One year and two months.

D.—Feels very well; says he would have been dead without injections; fine eyebrows appearing; nodules less, hands and feet not infiltrated; skin has lost shiny appearance; no leprotic reactions, but suffers from filariasis; nares, only a few faintly acid-fast granular or organisms.

Case 14.—Eronimo, aged 25:—

A.—Deformities; traumatic ulcers; acid-fast found in nares.

B, C, and E, as in Case 1.

D.—Does not get traumatic ulcers so often and heals readily when he does; feels energetic; nares negative for acid-fast organisms.

Case 15.—Sam, aged 30:—

A.—Large patch of diffuse thickening “lepra en cuirasse,” whole trunk and extremities and face numerous raised papules, from size of pin's-head to split-pea cut like small nodules, and on section scrapings are full of grouped acid-fast organisms; much fever and very ill.

B.—One year and nine months.

D.—To look at him there is no sign of leprosy, clean healthy-looking skin, ale of nose have been perforated for rings and give a lumpy appearance, but there are no nodules; nares are negative for acid-fast organisms.

Case 16.—Emelio, aged 38:—

A.—Nodules ears, cheeks, eyebrows; traumatic ulcers fingers; body covered with raised tender infiltrated patches; ulnar nerves tender and lumpy; leprotic fever; nares many, acid-fast organisms.

B, C, and E, same as Case 1.

D.—Face more lumpy, less nodular; infiltrated patches have all gone leaving pale indistinct areas;

does not get traumatic ulcers; nares, there are acid-fast organisms, but fewer and more difficult to find.

Case 17.—(Osea, male, aged 25:—

A.—A nerve case, but after a rigor nodules appeared on extremities; more superficial than usual and very tender; on section they showed many acid-fast organisms; perforating ulcer of foot.

B.—One year.

D.—Has had metatarsal bone removed, ulcer has healed; did not get leprotic fever for "many months" till recently, when he got an attack similar to one mentioned under A, but milder, still there were grouped acid-fast organisms in the papules; he says the treatment is doing him good.

Colonial Medical Reports.—No. 95.—Bihar and Orissa.

TRIENNIAL REPORT ON THE WORKING OF THE PATNA LUNATIC ASYLUM FOR THE YEARS 1915, 1916, 1917.

By **C. E. SUNDER, M.D., Lt.-Col., I.M.S.,**

Superintendent, Lunatic Asylum, Patna.

ADMISSIONS.

THE total number of receptions (excluding those re-admitted) was 94 in 1915, 72 in 1916, and 76 in 1917, the average being 81 against 82 in the previous triennium. The variations are generally difficult to explain.

RE-ADMISSIONS.

The total number re-admitted was 5 in 1915, 16 in 1916, and 13 in 1917. Of the re-admissions 15 were criminals and 19 non-criminals. Out of 5 re-admissions in 1915, 4 were criminals, 3 of whom returned to the asylum after trial, and 1 was admitted after an absence of six years five months and twelve days. The large increase under head re-admissions during the years 1916 and 1917 was due to observation cases now being shown as discharged otherwise and re-admitted.

Out of 16 re-admissions in the year 1916, 6 were criminals, 3 of whom were re-admitted after trial. One criminal female lunatic, who was received from Bhagalpur Central Jail and was sane on admission, was transferred again to Bhagalpur Central Jail under Government orders, but returned to this asylum after two months and eight days. She is certainly not insane, but makes herself obnoxious in jail, as she seems to prefer the asylum, in which she is exceedingly useful. Two criminal lunatics were received after long intervals. One non-criminal lunatic who was discharged cured had a relapse after four months and was re-admitted. The rest, nine cases, were re-admissions from observation cases.

There were 13 re-admissions in the year 1917, 5 of whom were criminals, 3 being re-admitted after trial. Two criminal and one non-criminal lunatics who escaped from the asylum were recaptured and re-admitted into the asylum. The rest, eight cases, were re-admissions from observation cases. Considering that the re-admissions formed such a small proportion of cases, it may safely be

stated that most of the lunatics who were discharged cured returned to the world as useful members of society.

DISCHARGES.

The total number discharged during the years 1915, 1916, and 1917 was 48, 58, and 57 respectively. Of these, 37, 28, and 38 recovered, and 7, 10, and 7 were made over to the care of the friends of the lunatics in improved condition. In 1916 four lunatics were taken charge of by their friends. There was an increase of recoveries amongst the inmates, the cause of this being the milder nature of the cases treated. One lunatic found to be a leper in 1917 was transferred to the Albert Victor Asylum for Lepers at Gobra, where there is a ward for the reception of such cases.

ACCOMMODATION.

The accommodation was insufficient during the years 1915 and 1916 amongst the criminals, when the daily average strength rose a little higher than the capacity. The capacity was raised in 1915 from 306 to 356 by the construction of a new sleeping ward for forty criminal males and a female ward with ten cells. In view of the steady increase of the daily average of criminal lunatics, it was thought that even the increased accommodation referred to above would be insufficient; hence sanction was obtained and work started in 1916 on another male criminal ward with forty beds. The work was finished in 1917. The capacity will thereby be raised from 356 to 396.

The overcrowding of criminal males during the years 1915 and 1916 was relieved by allowing harmless criminal lunatics to remain in the non-criminal ward at night. There would have been overcrowding in the year 1917 when the flood came and the floors of most of the wards were under water for several days, but this was avoided by removing

some of our inmates to the General Hospital and some to jail. During the day the lunatics are about the asylum grounds except in special cases.

SICKNESS AND MORTALITY.

The total number admitted into the Asylum Hospital was 288 in 1915, 396 in 1916, and 346 in 1917, the daily average sick being 22.61, 23.06, and 27.25, and percentage of constantly sick to daily average strength 7.17, 7.43, and 9.10 respectively.

The increase in the number of hospital admissions from 288 in 1915 to 396 in 1916 was due to large numbers of admissions for ankylostomiasis, pyrexia of uncertain origin, dysentery, and for a large number of trivial causes, such as minor injuries, abscess, &c., in order to keep such cases under proper supervision and care. Repeated admission of some of the cases was also responsible for the increase. The health of the inmates admitted to the asylum during the years under review was not good.

Dysentery was responsible for 23 admissions in 1915, 40 in 1916, and 28 in 1917, with one death in 1916 and two in 1917. These cases were treated with injections of emetine hydrochlor. and albugin enemata as they were amœbic or bacillary in origin. There were also some cases of mixed infection. Emetine bismuth. iodidi was introduced during the year 1917.

For ankylostomiasis, 47 were admitted in 1915, 73 in 1916, and 49 in 1917, with 22, 20, and 13 deaths respectively. Thymol was given in these cases. A systematic investigation of all patients in this asylum for the presence of intestinal parasites has been carried out for the last four years and the results recorded. No case has been returned as "ankylostomiasis" except when the symptoms were present, the ova found in the faeces and the diagnosis confirmed at autopsy by an independent observer.

For diarrhoea 23 were admitted in 1915, 20 in 1916, and 11 in 1917. There was no death from this disease during the triennium.

Eating of mud and faeces and any garbage the lunatics could lay hands upon was, as before, specially frequent during the years under review. Dysentery, diarrhoea and ankylostomiasis may be attributed to these causes acting before and after admission, but it would be interesting to have reliable figures for their extra-mural prevalence. The routine examination of excreta, blood and sputum in all cases (old and new) proved the presence of worms in a large proportion.

It is impossible to correct the enormous entozoa prevalence when segregation and constant watching are impossible with a limited number of keepers.

Eleven insanes were admitted to hospital suffering from tuberculosis in 1915, 10 in 1916, and 10 in 1917, the number of deaths being 10, 10, and 9 respectively. The diagnosis was confirmed microscopically, and the cases were treated with tuber-

culin and the open-air method, for which a ward was constructed in 1916. No special reason can be given for the increase of this disease, except that some patients were received who were suffering from tuberculosis.

Pyrexia of uncertain origin gave 24 admissions in 1915, 35 in 1916, and 15 in 1917. There was no death from this disease. Pneumonia gave 1 admission in 1915 and 3 in 1917, with only 1 death in 1917. Epilepsy was responsible for 1 death in 1915 and 2 in 1917. Kala-azar gave 3 admissions in 1915, 2 in 1916, and 1 in 1917, with 3, 1, and 1 deaths respectively. So common outside, it is extraordinary that more lunatics have not been affected. Anaemia gave 2 admissions in 1915, 2 in 1916, and 10 in 1917, with only 1 death in 1915. The etiological factors of these cases were not discovered.

Of zymotic diseases, none broke out in the asylum during the triennium. It is satisfactory to note here that, although plague was prevalent in adjoining quarters, it did not reach the inmates.

Admissions averaged 37 against 39 in the previous triennium. No definite reason can be assigned for the decrease of this class of lunatics. The system of discharging criminal lunatics after recovery, convicted of trivial offences, was strictly observed. There was no undue detention, and the number of this class was reduced as far as possible. In cases where friends could be found, harmless insanes, whose offences were of trivial nature, were made over to them with the sanction of Government. In the year 1915 one harmless criminal lunatic convicted of trivial offence was transferred to Dacca Lunatic Asylum under Government orders for making him over to his friends. In 1917 one leper criminal lunatic was transferred to Albert Victor Asylum for Lepers at Gobra.

There were 14 deaths in 1915, 17 in 1916, and 13 in 1917.

The largest number of lunatics admitted belonged to the age period of 20 to 40 years. After 60 years of age mental derangement was noticed in an average of only .84 per cent. of admissions.

Types of Insanity.—Amongst the number admitted, mania with its various sub-heads was the chief form of lunacy. Unlike melancholia, patients suffering from mania are more amenable to treatment than others, 16 having recovered in 1915, 10 in 1916, and 13 in 1917.

Dementia comes next in numerical importance. There was no recovery under this type in 1915, 5 recovered in 1916, and 5 in 1917. Dementia is really present in all types of insanity. It is insanity, in fact, and the only excuse for retaining it in any classification is to cover certain cases that do not readily come under other heads—types without distinctive symptoms or obvious causes. Our whole classification is, in fact, unlogical.

Insanity of Indian heup gave 10, 8, and 5 admissions respectively. The number recovered under this head were 7, 2, and 1 respectively.

Delusional insanity was responsible for 8, 4, and 6 admissions respectively, with only 1 recovery in 1915.

The number admitted under head Melancholia was 6, 2, and 5 respectively. The recoveries under this type being 3 in each year.

IDIOTCY.

Two were admitted in 1915, 2 in 1916, and 1 in 1917. The recoveries under this type was 1 in 1915 and 1 in 1917.

There were only 1 admission and 1 recovery in 1915 under head Post Febrile Insanity.

There were 23 admissions with 8 recoveries in 1915, 35 with 7 recoveries in 1916, and 35 with 15 recoveries in 1917, or 23-23, 39-77, and 39-33 per cent. respectively under head "Declared to have recovered or not yet diagnosed."

The alleged etiological factors were in 1915: Alcohol, 6; *ganja*, 19; fever, 1; other toxic, 1; total, 27. 1916: Alcohol, 6; *ganja*, 13; fever, 1; plague, 1; other toxic, 1; total, 22. 1917: Alcohol, 2; *ganja*, 11; fever, 1; total, 14.

There were a few cases of assaults and accidents. All of them were of a trivial nature, slight wounds, sprains, burns, &c., requiring no comments.

There were three escapes during the year 1915, of whom two were criminals and one non-criminal. Both the criminal lunatics were recaptured. Two criminal lunatics escaped during the year 1916, of whom one was readily recaptured and brought back to the asylum, the other being still at large. In the year 1917 four lunatics escaped. Three of these were criminals and one non-criminal. One non-criminal and two criminal lunatics were recaptured. The defaulting keepers and head keepers were suitably punished, and in some cases reward was given to the persons capturing the lunatics.

There was some discontent among the subordinate staff in regard to their pay and it was exceedingly difficult to obtain keepers, male or female. The candidates we obtained were of an inferior class, lacking in intelligence, tact and patience. Our keepers were constantly resigning and there was a strike among the female keepers, so it was decided in 1916 to make these posts peculiarly attractive. Consequently the establishment was revised and the pay of the keeper staff was raised in 1917.

Many of the inmates are not only unfit for any

work but refuse to do it. The lunatics were employed in cooking, gardening, rope-making, soorkhi pounding and grinding *Atta*, *Dal*, mustard oil, &c., and also as masons, carpenters and blacksmiths. There was no dairy farm in this asylum, and we may be obliged to start one because of the difficulty in procuring good milk.

The lunatics were well looked after and well fed but have latterly been indifferently clothed because of the refusal of the Jail Department to help under present war conditions. Blankets we cannot get except in the open market. The convalescent and weak inmates were given extra blankets and bedding as required, and the infirm gang system was maintained with great benefit to the debilitated. The suicidal and epileptic patients were kept separately and properly guarded. Prophylactics were regularly issued during the unhealthy season of the years, and prophylactic treatment for dysentery was given to all new admissions, as usual, during their first week in the asylum. Various amusements and musical instruments were provided for the inmates. In short every effort was made to keep the lunatics cheerful and comfortable.

Sane and well-behaved lunatics were allowed to go outside with the approval of the Inspector-General of Civil Hospitals, Bihar and Orissa, where they did some work in the open, weeding and cleaning and pottering around for most part. The daily outing was liked by the men and the local congregation was relieved during the day, when most obnoxious. The literate lunatics were provided with various kinds of books and newspapers. Hard-working and well-behaved lunatics were rewarded with small monthly stipends which were deposited in the Post Office Savings Bank and given to them on release. They were also allowed to send their money to their friends.

Due attention was paid to the sanitation of the asylum. Formerly conservancy used to be carried out on the dry earth system and the night-soil used to be buried in the asylum garden but the available area for trenching night-soil was built over, and it is now removed in Municipal carts. The stools of dysentery and ankylostomiasis patients were burnt. The wards and cells were daily flushed with phenyle and were kept clean and dry. The wards and hospitals were frequently whitewashed. All possible precautions were taken with regard to the drinking water by boiling it and then distributing the same in locked drums fitted with taps.

Colonial Medical Reports. No. 96. Bihar and Orissa.

ANNUAL RETURNS OF THE HOSPITALS AND DISPENSARIES FOR THE YEAR 1917.

By the Hon. G. J. H. BELL, Colonel, C.I.E., M.B., I.M.S.,

Inspector-General of Civil Hospitals, Bihar and Orissa.

THE total number of hospitals and dispensaries opened on December 31, 1916, was 387. During the year under report, fifteen local fund, one private-aided and two railway dispensaries were opened and twenty-one mission and private non-aided institutions, which were already existing, were brought under the recognition of the Medical Department and added to the list.

During the past two years the District Boards of the Province have opened not less than thirty new dispensaries, and have also provided in-door accommodation in some of the existing dispensaries. I think there is still great need for more such medical institutions in many parts of the Province, and it is hoped that they will be gradually provided as funds permit.

A new travelling dispensary was started in February, 1917, but it was closed in the following August, as it was not found to be working well. The total number of patients treated at all the dispensaries of this class was 75,563 in 1917 against 69,852 in 1916, net increase of 5,711 patients being satisfactory, especially in view of the closure of a few dispensaries during the portion of the year.

The total number of patients treated during the year in all classes of hospitals and dispensaries showed an increase of 344,028 or 9.96 per cent. This increase was due partly to the opening of new dispensaries and partly to the inclusion, for the first time, of the statistics of some existing mission and private non-aided institutions which were not hitherto recognized by the Medical Department.

In the State-Public, Local Fund and Private-aided institutions were treated 37,133 in-patients and 2,761,971 out-patients respectively. Of the in-door patients treated in 1917, 23,281 were cured, 5,933 were relieved, 4,379 were discharged otherwise, and 2,110 died. The percentage of patients represented by friends and relatives decreased from 21.6 to 19.0, apparently owing to the discouragement of the system of treatment by proxy which is not desirable. The State-Special, Railway and Private non-aided hospitals and dispensaries in the Province also did their due share of work in giving medical relief to the sick within their respective areas.

The year under review was unhealthy, as appears from the death-rate amongst the general population. The increased mortality is attributed to the prolonged and excessive heavy rains and consequent

flooding. Cholera, diarrhoea, dysentery, plague and malaria all showed considerable increases.

Deaths from cholera and plague increased among the general population. The dispensary attendance also rose amongst in-patients. The admissions for dysentery and diarrhoea were also more than in the previous year. Quinine "treatments" worth Rs. 23,534, were sold to the public during the year under review.

The total number of cases of small-pox treated during the year was 388 with 5 deaths only. Forty-three of them had distinct marks and 121 had faint marks of vaccination. In 25 cases no marks were found while 24 cases were unprotected. The vaccinal conditions were not noted in most of the out-door cases, specially in the Railway and Private non-aided institutions not under the supervision of Government.

The number of cases treated for tubercle of the lungs also increased. The increase may possibly be ascribed to better diagnosis. The tuberculosis ward at the Bhagalpur Sadr Hospital, which was under construction in 1916, has now been completed.

Leprosy gave practically the same number of admissions at the hospital and dispensaries as in the preceding year. The number of beds available for leper inmates also remained almost the same.

The noticeable feature is that the number of female patients treated in all classes of hospitals and dispensaries in the Province increased from 955,242 in 1916 to 1,101,478 in 1917, or 15.31 per cent. The percentage of females to the total number of patients treated also rose from 27.58 to 28.93, which is, I think, satisfactory.

The surgical operations performed in all classes of hospitals and dispensaries numbered 152,005 against 148,076 in 1916.

Amongst the selected and important operations, which numbered 10,181, 3,044 were performed for the extraction of the lens for cataract, 72 for abdominal sections (laparotomy), 97 for lithotomy, 21 for ovariectomy, 47 for litholapaxy, 152 for radical cure of hernia, 88 for strangulated hernia, 72 for abscess of the liver, and 287 for scrotal tumour.

Civil surgeons visited the Sadr Hospitals daily when they were present in the station and the other institutions at the headquarters were visited by them as frequently as possible.

Civil surgeons also examined, as far as possible, the general health of the young European Civil Officers serving in their districts, and also inquired into the state of health of other officers.

In view of the great importance of the subject of nursing and the arrangements for the training and employment of nurses, it is disappointing to note the wholly inadequate provision existing in Bihar and Orissa. As the result of a general inquiry undertaken at the request of the Local Government, it was reported this year that facilities for the training of Indian nurses and midwives are in existence in only a very few hospitals. It is doubtful if

anything really effective on an appreciable scale can be attempted without special provision, such as the formation, somewhat on the lines of the Central Midwives Board in England and similar bodies in Bombay and Bengal, of a Board charged with centralizing the various scattered, though meagre, resources already available for the purpose, and with co-ordinating, on a uniform basis, of the training, examination and employment of nurses in Bihar and Orissa. As usual, the difficulty of finance is the chief drawback, which can be removed only by liberal subsidies from Provincial and Local Funds, as is the case in other provinces.

Colonial Medical Reports.—No. 97.—Trinidad and Tobago.

ANNUAL REPORTS OF THE MEDICAL INSPECTOR OF HEALTH AND MEDICAL OFFICERS OF HEALTH ON HEALTH CONDITIONS IN TRINIDAD AND TOBAGO DURING THE YEAR 1917.

VITAL STATISTICS.

Population.—This was estimated by the Registrar-General to be 375,559 at the middle of the year 1917. In 1916 it was 368,231.

The density of population was 201 persons per square mile.

The total number of births registered was 12,566, of these 6,346 were males and 6,220 females. In 1916 the number of births was 11,917 (6,038 males and 5,879 females). The birth-rate was 33.46 per 1,000 of population in 1917. In 1916 it was 32.36.

The number of still-births during the year was 925 (476 males and 449 females). It is well known that many infants are born dead as a direct result of ignorance of the kind neighbour or the unqualified village "Midwife" who has for several generations helped to bring into life most of the men and women born and now living in the particular village. The women have naturally every confidence in and look to her on the approach of their time of travail being blissfully ignorant of the fact that it is thanks to nature and not to the superstitious old woman's efforts, really in spite of her ministrations, that they successfully embarked on this life.

One of the most important measures against the high rate of infantile mortality in the Colony will be the provision of modern qualified district nurse-midwives in all districts of the Colony without exception.

The total number of deaths from all causes registered in the Colony was 7,982.

The following table shows the particulars of population, birth, death and infant mortality rates in all registration districts:—

	Population	Birth-rate	Death-rate	Infantile Mortality
Port-of-Spain ...	67,328	25.31	27.70	242
St. Ann's ...	15,518	28.85	21.23	167
Diego Martin ...	20,178	28.94	15.56	145
Tacarigua ...	35,537	35.29	20.12	144
Blanchisseuse ...	1,615	21.05	8.67	59
Arima ...	16,174	35.98	22.38	141
Toco ...	7,752	28.25	12.13	100
Manzanilla ...	20,593	34.38	19.67	171
Chaguanas ...	19,641	34.21	21.08	159
Conva ...	15,408	28.95	21.87	148
Montserrat ...	19,314	38.52	11.49	79
San Fernando ...	9,738	37.40	60.46	214
Naparima ...	33,763	38.83	19.40	135
Savanna ...	38,457	40.41	18.41	127
Cedros ...	8,855	34.22	17.96	125
La Brea and Oropuche ...	18,366	36.10	17.48	164
Mayaro ...	4,993	33.65	23.43	137
Tobago ...	23,363	37.02	16.86	104

A study of the above figures reveals several interesting facts, and warrants certain deductions.

The highest birth-rate occurred in Savana Grande district (40.41).

The next highest in Naparima (38.83).

The next highest in Montserrat (38.52).

The lowest birth-rate was recorded in Blanchisseuse (21.15).

The highest death-rate was observed in San Fernando (60.46), the next highest in Port-of-Spain (27.7), and the lowest in Blanchisseuse (8.67).

In all districts the birth-rates were higher than the death-rates except in Port-of-Spain and San Fernando. Theoretically, therefore, and judged from a comparison between the birth and death-rates the healthiest place in the Colony during 1917 was Montserrat, the next being Blanchisseuse and

the next Savana Grande. San Fernando similarly was the least healthy and Port-of-Spain next.

The very high mortality in the two towns, and principally in San Fernando, is due to the large influx into the Colonial Hospitals, of sick persons, many of whom are admitted in a hopeless condition and die soon after admission.

In Port-of-Spain nearly one-third of the total number of persons who died in the Colonial Hospital came from outside districts, and in the San Fernando Hospital, approximately two-thirds of the number who died were from places outside the town. These deaths should properly be recorded against the districts from which they came and the town death-rate corrected accordingly.

INFANTILE MORTALITY.

The highest infant mortality rate was recorded in Port-of-Spain (242), and the next in San Fernando (214); the lowest infant mortality rate was in Blanchisseuse (59), the next being Montserrat (79). Savana Grande which has such a high birth-rate and low general death-rate has comparatively a high infant mortality rate (126.6).

This high rate of mortality among infants has for a long time been recognized to be a serious matter. As far back as May, 1904, Dr. Dickson, then Assistant Medical Officer of Health of the Colony, submitted a report dealing with the excessive infant mortality in Port-of-Spain.

The following are the proved facts:—

1. Infant mortality is excessive.
2. The majority of deaths occur in the first three months of life.
3. During the first month when it is at its highest the deaths are due to congenital defects and maternal ignorance or carelessness, as well as to weakness and constitutional disease of the mother.
4. In succeeding months the chief cause of death is the group of diarrhoeal diseases, the result of improper and careless feeding.
5. In some country districts malaria contributes some of the deaths.

In 1916 District Nurse Midwives were appointed at Tunapuna, Sangre Grande and Toco. For some reason or other it was found necessary to abolish the posts at Toco and Sangre Grande. The only district nurse in the country at present is the one at Tunapuna, who is doing splendid work.

In 1915 Surgeon-General, Dr. Clare, suggested an out-patient maternity department attached to the Colonial Hospital, Port-of-Spain. Two trained midwives were employed as district nurses. They have done and are doing much useful work in the town in attending on midwifery cases and in visiting infants and advising upon their proper feeding and care.

In July, 1916, Dr. Clare submitted a scheme for further dealing with high infant mortality, including:—

- (a) Early notification of births, and
- (b) Establishment of a Mothers' and Infants' Clinic at the Colonial Hospital, Port-of-Spain.

The Early Notification of Births Ordinance was passed in 1916 but had not come into force up to the end of 1917. Towards the end of the year arrangements were made for opening the Clinic at the beginning of the New Year, 1918. The Government has therefore not failed to make a beginning in the campaign against high infant mortality and it is hoped that the formation of a League having as its object the preservation of infant life will result in much lasting good not only in the town but also in country districts.

COMMUNICABLE DISEASES.

The following diseases were declared by the Governor to be dangerous infectious diseases by notice in the *Royal Gazette* of April 10, 1917: Plague, Cholera, Yellow Fever, Small Pox. No case of any of these diseases occurred during the year in any part of the Colony.

Enteric Fever.—As has been well known for a long time this disease is very prevalent in Port-of-Spain and to some extent in other districts.

Even without compulsory notification 163 cases were observed with 38 deaths during 1916 in Port-of-Spain. The figures for 1917 were 176 cases with 51 deaths. This does not necessarily mean that there was a greater prevalence in 1917, as many cases were never heard of in 1916. These unknown cases are the ones which hitherto have constituted the greater menace to the public health; for with regard to them, no precautionary measures of any kind were or could be applied, and they were foci from which the disease spread unhindered.

In districts outside Port-of-Spain the position is even more striking, for it was only occasionally that any case of infectious disease (other than dangerous infectious diseases, viz.: Yellow Fever, Plague and Small Pox concerning which special regulations existed) was brought to the notice of the Health Authority.

In districts outside Port-of-Spain 167 cases were notified, and there were 96 deaths in 1916, as compared with 309 cases notified and 110 deaths in 1917.

In Tobago there is a remarkable absence of enteric in spite of the free and intimate communication between the Island Ward and Port-of-Spain.

Now that all cases of enteric which are seen by medical practitioners are notified there is every reason to hope and believe that the increased attention to general sanitary matters which is observed on all sides, the precautionary measures being applied in all cases of enteric, the improvement generally in the important matter of the collection and disposal of house refuse, the improved control of the milk supply as well as at some future date the provision of adequate supplies of wholesome drinking water in all populous villages and on all estates without exception, will assuredly result in a gradual diminution from year to year in the number of cases of enteric and ultimately its extinction.

Preventive inoculation or immunization against enteric fever which is being now (1918) generally

carried out was not employed to any extent during the year 1917.

Diphtheria.—Though sporadic cases of diphtheria are observed from time to time, the disease has never been known to occur in epidemic form in any part of the Colony. The beneficial effects of treatment by diphtheria antitoxin, when administered early in the course of the disease, has been very striking here.

Tuberculosis.—At a meeting of the Central Board of Health held on May 9, 1917, an important resolution was moved by Dr. Prada recommending that tuberculosis (in all its forms) should be proclaimed an infectious disease under Section 100 of the Public Health Ordinance and therefore made compulsorily notifiable. This resolution which was the outcome of representations made by the Medical Officer of Health, Port-of-Spain, who is also Tuberculosis Officer under the Association for the Prevention and Treatment of Tuberculosis, was amended on the motion of Dr. Laurence to apply only to pulmonary tuberculosis, and was passed as amended.

Reference to the table shows that 365 cases were notified during the year, of which 248 were from Port-of-Spain, 5 from San Fernando, 3 from Arima, 34 from Tunapuna, and 75 from the rest of the Colony, bearing out the thesis that tuberculosis is the disease par excellence of crowded centres of population.

The solid work of education carried on by the Association for the Prevention and Treatment of Tuberculosis is bearing splendid fruit, and along with preventive measures carried out by sanitary authorities everywhere must result in a marked diminution in the ravages of this fell disease.

Malaria.—This disease prevails in most districts outside the limits of Port-of-Spain. The proximity of the south-eastern portion of the town to the Laventille swamp makes it impossible to absolutely exclude all chances of malaria infection manifesting itself within the city limits. Nevertheless in my report on the health of Port-of-Spain for 1916, I show that 25 cases of malignant malarial fever occurring in the city which were investigated were all traced to sources outside the city or from Venezuela.

DISTRIBUTION OF QUININE TO SCHOOL CHILDREN.

In May, 1917, the District Medical Officers of Chaguanas, Oropuche, Erin-Guapo, Toco, Bocas-Diego Martin and Cedros were asked to name the schools in which the distribution of quinine was most required and was likely to produce the greatest benefit.

Quinine bisulphate in tabloid form and in 5- and 3-grain doses was issued to each of the District Medical Officers mentioned and by them to the teachers of the schools.

NUMBER OF CASES OF MALARIAL FEVER TREATED IN HOSPITALS.

The number of cases of malarial fever admitted to the Colonial and District Hospitals as well as the

number of fatal cases were 863 with 30 deaths. As usual none but serious cases are admitted to hospital; this incidence of severe forms of malarial infection is certainly not alarming in a population of over 375,000 inhabitants.

The number of deaths from malaria registered during 1917 was 743. Rate per 1,000, 1.98.

ANKYLOSTOMIASIS.

The disease prevailed in most districts but occurred in largest numbers as in previous years in Naparima (including San Fernando) and Couva and Chaguanas, in which are the large sugar estates with their large East Indian population.

In the Colonial Hospital, Port-of-Spain, there were 147 cases treated, with 6 deaths, and in San Fernando Hospital 337 cases and 29 deaths.

The Trinidad Ankylostomiasis Commission carried on its operation against Hookworm disease in the districts of Tunapuna, St. Joseph and San Juan. Local authorities are being urged to give every help to the Commission's work, and the Medical Officer, Dr. Payne, was in constant communication with this department with a view to bringing about necessary improvements in latrine accommodation generally.

The number of deaths registered as due to ankylostomiasis in the whole Colony during the year 1917 was 240, i.e., a rate of 0.64 per 1,000, as compared with 251, and a rate of 0.68 per 1,000 in 1916.

The following is a return of prisoners who were examined and received treatment for ankylostomiasis at the Royal Gaol:—

First Treatment—

No. of prisoners treated	...	2,830
No. of prisoners who passed worms	...	1,880 i.e. 66.4% infected.

Second Treatment—

No. of prisoners treated	...	1,468
No. of prisoners who passed worms	...	867 i.e. 59 % infected.

Third Treatment—

No. of prisoners treated	...	1,170
No. of prisoners who passed worms	...	417 i.e. 35.6% infected.

HEALTH REPORT.

The year 1917 may be properly looked upon as one of preparation and of adaptation of machinery, authorities and officers under the old regime to an entirely new state of things brought into being by the new law.

Though some material progress was made in the sanitary affairs of the Colony in the course of the year, and more so in some districts than in others, yet on the whole the record is necessarily one of preliminary effort and spade work, the beneficial effects of which will appear in future years.

DIGEST OF ANNUAL REPORTS OF MEDICAL OFFICERS OF HEALTH.

Bocas Diego Martin District (M.O.H., Dr. Howatson).

An outbreak of dysentery occurred at Rich Plain, Diego Martin, but was easily checked.

There were two convictions for selling unsound food.

Colonial Medical Reports.—No. 97.—Trinidad and Tobago
(continued).

Water Supply.—Diego Martin water works and river (unsatisfactory). Carenage, reservoir with good supply. Islands, rain water. Chaguararnas, wells.

Earth closets in all parts of the district.

Ankylostomiasis — Very prevalent in Diego Martin.

Yaws—Prevalent chiefly in Diego Martin, Mucurapo and Maraval.

St. Joseph and Santa Cruz District (M.O.H., Dr. Perez).

Health of the district was good.

Malarial fever, dysentery and ulcers were prevalent.

A few cases of typhoid fever occurred.

Tacarigua District (M.O.H., Dr. C. B. Reid).

Typhoid Fever.—54 cases were notified—fewer than last year. 21 cases were treated at the District Hospital.

Pulmonary Tuberculosis.—14 cases notified.

Leprosy.—9 cases were reported.

Sale of Milk.—Bylaws are required.

Water Supply.—Tunapuna, satisfactory; pipe borne. Tascarigua proper and Eldorado Village (parts of) ample supply of doubtful quality from a reservoir. Arouca village, small stream and contaminated wells; quality uncertain.

Streams and Rivers.—State good. Local Authority takes steps by notices and prosecutions to prevent pollution.

Drainage.—Mostly earth drains. Concrete drains in parts of Eastern Main Road through Tunapuna Village and Arouca Drains are usually in bad condition and in some places choked with rubbish.

Sewage.—From large cesspits is buried in the cemetery lands. Latrine accommodation is sufficient in Tunapuna.

Food.—Sale takes place along Eastern Main Road and food exposed to contamination from dust. Bylaws are required to provide for covering of certain kinds of food.

Arima District (M.O.H., Dr. E. N. Darwent).

Outbreak of malignant malaria occurred in Maturita from August to October, 1917. Measures taken to destroy mosquito breeding places.

Water Supply.—Ample and of good quality in the Town of Arima. In other parts of the district water obtained from rain, shallow wells, rivers.

Privy accommodation—Pit system.

Population of Town of Arima—4,000. Arima Ward Union—11,786.

A few cases of influenza occurred in January.

In April cases of typhoid occurred in Redhill.

There were 88 cases of ankylostomiasis with 13 deaths.

The Ankylostomiasis Commission did good work in the district.

Toco District (M.O.H., Dr. J. Grell. Acting M.O.H. (Dec.), Dr. Tsoi A. Sue).

Health of district was good.

Malaria.—An Anopheles survey showed the existence of breeding places in pools along the public roads and swamps in low-lying places.

Pulmonary Tuberculosis.—5 cases were reported.

Dysentery.—3 sporadic cases.

Couva and Pointe-a-Pierre District (M.O.H., Dr. J. MacFarlane).

There was no epidemic.

Enteric Fever.—Fewer cases of enteric fever were observed than in former years. The usual precautionary measures were adopted.

The Sanitary Inspector's work was satisfactory and the results good.

Milk Supply.—Only a few cow pens are satisfactory. The milk cans are unsatisfactory.

Beef Supply.—Is good, but the manner in which it is exposed for sale at the road side under the shop galleries is unsatisfactory.

Water Supply.—The chief supply is rain water stored in cisterns, tanks, barrels, &c. There are two good cisterns, one at Couva and one at California. Water is also obtained from surface wells and from Couva River.

River Pollution.—Couva River passes through Spring Exchange and Alexander Villages. Signboards have been erected at various places warning the people against pollution of the water.

Drainage.—The principal line of drainage consists of main drains running east and west. They often contain stagnant water. In the upper part of Exchange Village these drains are concreted.

Privy Accommodation.—Pit system is generally in use. Pail system at District and Estate hospitals.

House Refuse.—Is removed by a scavenging cart at Government expense and burnt at regular intervals on the dumping ground.

Morbidity and Vital Statistics.—The chief diseases treated were malaria and ankylostomiasis.

Malaria.—1,574 cases treated in five hospitals, with 1 death.

Ankylostomiasis.—217 cases with 8 deaths.

Dysentery.—Less prevalent than in previous years.

Pulmonary Tuberculosis.—11 deaths.

Other forms of Tuberculosis.—6 deaths.

Cancer.—7 cases were observed.

Gran Couva District (M.O.H., Dr. W. F. Cleaver).

Rainfall.—Evenly distributed and not much above normal.

Malarial Fever.—Prevalent to average extent.

Dysentery.—Not very prevalent.

Chicken Pox.—Occurred early in the year.

Whooping Cough.—There were a few cases.

Pulmonary Tuberculosis.—One fatal case was notified in August.

Enteric Fever.—One case was notified in December.

Water Supply.—Scanty in dry season—no public supply. Intermittent pipe-borne supply in Gran Couva village from a spring on private lands. There are two wells in Tortuga and one at Flanagan Town.

Privy Accommodation.—Limited.

Guaracara District (M.O.H., Dr. A. Robinson).

Health Condition.—Satisfactory.

Malaria.—Benign in type occurred in the Guaracara valley.

Ankylostomiasis.—Very prevalent on estates and among vagrants.

Ground Itch.—Very prevalent among indentured immigrants.

Enteric Fever.—Rather more than usual.

Dysentery.—There were fewer cases of dysentery.

Milk Supply.—By-laws regulating sale of milk are required.

Sale of Meat.—Shopkeepers should be licensed to sell meat.

Water Supply.—The Guaracara River is the source of supply in the lowlands, elsewhere from ravines and ponds.

Manzanilla District (M.O.H., Dr. D. E. Gannes).

Rainy season was the most severe for many years.

Malarial fever was very prevalent during the last quarter.

Some sporadic cases of typhoid fever in Cunapo Village.

Diarrhoea and marasmus were prevalent among children.

One hundred and fifty-one cases of yaws were sent to the Yaws Hospital.

Thirteen cases of ankylostomiasis were treated among indentured immigrants.

South Naparima District (M.O.H., Dr. E. A. Doyle).

No epidemic occurred during the year.

Sporadic cases of dysentery occurred.

Malignant Malarial Fever.—There was an increase in the number of cases.

Enteric Fever.—A larger number of cases occurred than during the previous years.

Ankylostomiasis.—There is an interest shown in the treatment for this disease.

Water supply is unsatisfactory.

Princes Town and North Naparima District (M.O.H., Dr. J. F. Gibbon).

The year on the whole was unhealthy, and there was a mild outbreak of enteric fever.

The principal diseases were ankylostomiasis, malaria, diarrhoea, dysentery, bronchitis, enteric, pthisis pulmonalis.

The most important causal factors are the defective water supply and the absence of an efficient system of sewage disposal.

Water Supply.—Drinking water is derived from

ponds, water holes and shallow wells, open to surface contamination and reduced to foul pools of liquid mud in the dry months.

Sewage System.—The pit system is in use and requires supervision by a sanitary inspector.

Enteric Fever.—There was an outbreak during the year.

Dysentery and Bowel Diseases.—Common, the causes being bad water and flies.

Recommendations are made regarding buildings, milk supply, slaughtering, inspection of animals before slaughter, the manufacture of aerated waters, the protection of articles of food from flies.

Indian Walk District (M.O.H., Dr. F. A. Mahabir (Acting)).

Prevailing diseases were malarial fever and dysentery.

Malignant malarial fever was prevalent in September, October and November, especially at Rio Claro.

Mayaro District (M.O.H., Dr. A. J. Pampellonne; Acting M.O.H., Dr. N. H. Brewster).

There were no epidemics. One fatal case of enteric occurred. Malaria was very prevalent.

There were three cases of blackwater fever—all recovered.

Milk Supply.—(1) No properly constructed byres; (2) uncleanness of vendors.

Water Supply.—Rain water stored in tanks, cisterns and barrels. Shallow wells and ponds. Supply is scant during the dry season.

Privy Accommodation.—Mostly of pit system. Ninety-nine privies were erected in the district during 1917.

House Refuse.—Is burnt and buried.

Cedros District (M.O.H., Dr. K. Inniss).

Sanitary Inspection.—The Ward Officer performed the duties of sanitary inspector in addition to his other duties. The extent of district and general backwardness of sanitary matters make the appointment of a whole-time sanitary inspector desirable.

Incidence of disease.—There was no unusual prevalence of disease.

Typhoid.—23 cases occurred with two deaths.

Dysentery.—38 cases were attended with two deaths.

Malaria.—Was prevalent as usual. 505 cases attended.

Milk Regulations.—Should be framed.

Water Supply.—Obtained from ponds, wells, rain water in tubs, casks, &c., and is unsatisfactory as to quantity and quality. There are no rivers.

Drainage.—Swamps and lagoons in many places along the coast.

Privies and cesspits.—The deficiency in privy accommodation was remedied during the year, though the type of structure is not good in many cases.

Disposal of Rubbish.—No satisfactory method exists.

Stables and Pens.—Require attention.

Oropouche and La Brea District (M.O.H., Dr. F. A. Rodriguez).

There were no epidemics.

A few cases of enteric fever were reported.

Yaws.—23 cases were sent to the Yaws Hospital.

Ankylostomiasis.—16 deaths occurred from this disease.

Water Supply.—Wells in large villages, open water holes in other parts; very little rain water is stored.

Erin-Guapo District (M.O.H., Dr. Eric de Verteuil).

Health of the district was satisfactory.

Dysentery.—Marked decrease in number of cases.

Malarial Fever.—Definite increase in number of cases. A good number of malignant type.

Typhoid Fever.—One case certified at Chatham.

Sewage Disposal.—Is unsatisfactory, especially in the villages.

Drainage and Water Supply.—Concrete drains and concrete cisterns are required in Erin and Pepper villages.

Scarborough District—Tobago (M.O.H., Dr. E. G. Blanc).

The health of the district was good.

The rainfall was fairly satisfactory.

There were no epidemics.

Malaria of benign type was very prevalent.

Diseases most prevalent were those due to bad feeding of children.

There were two cases of enteric fever, two cases of membranous croup, one case of pulmonary tuberculosis.

Milk Supply.—Cows are mostly kept in the open pasture and milked there.

Water Supply.—Is fairly good—mainly rain water in the town. In the Leeward district water of doubtful quality.

Cesspits.—Pail and dry earth system of sewage disposal.

House Refuse.—Dumped on sea beach or buried.

Plymouth District—Tobago (M.O.H., Dr. J. L. Pawan).

The health of the district was good. There was no outbreak of epidemic disease.

Malaria was unusually prevalent.

Bacillary dysentery is endemic in the district.

Tobago should be divided into two sanitary districts, each under the supervision of a well-trained and energetic sanitary officer.

Food.—Consists mainly of ground provisions and fish. The average labourer is a vegetarian.

Milk is good. Cattle are free from tuberculosis, and pigs from trichina and cysticercus.

Water supply is abundant, there being numerous rivulets in the neighbourhood of villages. Rain water is also stored, but in unscreened receptacles. There are a few surface wells which should be abolished.

River Pollution.—The streams are polluted by washing and personal ablution.

Sewage Disposal.—There is a general insufficiency of privy accommodation. Cesspits are provided in very close proximity to the dwelling-houses. The pail system has been made use of to a very small extent.

The Removal of House Refuse.—Is not done, refuse being thrown out of the house on the ground.

Vital Statistics.—Congenital syphilis is common among infants.

Roxborough District—Tobago (M.O.H., Dr. E. Hamel Smith).

Diseases most common: (1) Malaria; (2) digestive troubles and malnutrition in infants.

Thirty-six cases of ankylostomiasis were treated.

Milk Supply.—Cows are usually milked in the pasture.

Water Supply.—Good drinking water is got from rivers and springs, and rain water is stored in barrels.

Privy Accommodation.—Privies unsatisfactory with few exceptions. Pits and pails in use.

House Refuse.—Is burnt; manure collected for estates.

Colonial Medical Reports.—No. 98.—Trinidad and Tobago.

REPORT OF THE SURGEON GENERAL FOR THE YEAR
ENDING 31st DECEMBER, 1917.

By F. A. de VERTEUIL,

*Acting Surgeon-General.*ANNUAL REPORT, COLONIAL HOSPITAL, SAN
FERNANDO, 1917.

A LAUNDRY building was erected to the north-west of the isolation ward and operations were commenced in August. The extra supervision required is being willingly and thoroughly carried out by the matron and her staff. It has been impossible to utilize and thoroughly test the petrol air gas system which had recently been introduced, in consequence of special lighting regulations having come into force soon after its installation.

The isolation ward was improved by the addition of a gallery on its eastern side for protection of the mosquito-proof wire netting.

The grounds were kept in a fairly satisfactory condition, in spite of the difficulty experienced in meeting the increased cost of labour.

The water supply was of good quality, but its quantity was deficient towards the end of the prolonged dry season, when the institution had to rely entirely on the water supplied from the union springs. Some temporary inconvenience was then experienced.

The drainage within the hospital grounds is good. It is very desirable, however, that the pools of water collected along the seashore to the west of the institution, and kept by the retaining wall in connection with the railway line, should be dealt with at the earliest date possible. Mosquito larvæ (malaria type) have been found in these pools, and, with the hospital—which is not mosquito-proof—situated between the town of San Fernando and the pools, it is reasonable to infer that they contribute towards the spread of malaria. During 1917 an increase in the number of malarial fever cases from the town of San Fernando has been noticed.

Sanitary Conditions.—The fly proofing of the latrines, an urgent necessity, was completed.

The dietary has continued to be very satisfactory when the difficulty of obtaining certain articles is taken into consideration, a consequence of the cancellation of contracts and increased cost.

Accommodation is provided for 123 patients. The greatest number in hospital in any one day was 137 and the lowest number was 87, the average being 108.

It has been found that the difficulty in restrict-

ing the admissions to hospital so as not to exceed the authorized number is increasing. The following are the chief causes which are contributing towards this condition:—

(1) An increase in the number of maternity cases. During 1916, 68 cases of pregnancy were admitted. This year, 124 cases of pregnancy, in addition to 13 cases of abortion, and 22 cases in the puerperal stage, a total of 159 cases. Many of these patients came to hospital from a great distance and could not be refused admission; while those who resided in San Fernando invariably waited until they were advanced in labour before seeking admission, a course that precluded any possibility of their being rejected. The supply of midwives to the town of San Fernando is inadequate to meet the demands of the public, especially the poorer classes. To remedy this state of affairs, it is therefore to be hoped that it may be found possible to institute a small extern maternity of nurse midwives along the lines adopted at the Colonial Hospital, Port-of-Spain. The erection also of a small maternity ward would relieve the overcrowding in the general wards, in addition to the evident convenience which would accrue to all concerned.

(2) The admission of large numbers of advanced ankylostomiasis, dysentery, malarial fever, and enteric fever cases.

The Mortality.—The total number of patients admitted was 3,074. The total number of deaths was 356, 46 of which occurred within forty-eight hours, and fifty-four within seventy-two hours of admission.

The chief diseases treated were:—

	Admissions	Deaths
Ankylostomiasis	326	29
Veneral	315	4
Malaria	218	4
Dysentery	213	57
Respiratory diseases (excluding phthisis)	207	39
Ulcer	146	0
Chronic Nephritis	144	40
Wounds	125	5
Abscess and Cellulitis	115	0
Cirrhosis of Liver	95	44
Enteric Fever	88	29
Phthisis Pulmonalis	33	10

Enteric Fever.—There was a definite increase in the number of patients admitted suffering from this condition.

Colonial Medical Reports.—No. 98.—Trinidad and Tobago
(continued).

Malarial Fever.—During 1917 a larger number of patients than usual from the town of San Fernando were admitted to hospital suffering from the disease. The explanation that the disease has been contracted from the country districts is only applicable to a limited number of these cases.

Ankylostomiasis.—This disease was again responsible for the largest number of admissions and contributed towards the production of cirrhosis of the liver and kidneys, which latter together produced the greatest number of deaths.

Veneral diseases were in excess of the admissions of the previous year.

Dysentery.—This disease individually contributed the largest share towards the death-rate, and the admissions were also in excess of those of the previous year. Like enteric fever, water and flies are chiefly responsible for its increase.

Cirrhosis of the Liver and Kidneys.—As previously mentioned, malaria and ankylostomiasis cannot be overlooked as primary factors towards producing these incurable conditions.

Tetanus.—The admissions were double those for 1916.

Scorpion Poisoning.—An unusually large number of admissions; there were ten admissions in 1916. The treatment with potassium permanganate is probably responsible for the absence of deaths.

Burns.—There were eight deaths. During the latter half of the year the method adopted at this institution has been the application of the modified ambrine preparation (i.e., paraffin wax, &c.) in vogue in France. The results here have been more satisfactory than those previously obtained by other methods.

Eclampsia.—(c) A reference to the one death from this cause, which occurred in the series of 12 cases treated, is interesting in consequence of the long period which supervened subsequent to the cessation of convulsions before death occurred. A young woman, aged 19, was admitted with pre-monitory symptoms of eclampsia (cephalgia, giddiness, albuminuria, &c.). Five days later she delivered normally, twenty-four hours later she developed convulsions which ceased after twenty-four hours. She then remained four days in an unconscious state before succumbing.

(b) An unusual condition, difficult of explanation, ought also to be recorded. A primipara, aged 20 years, was admitted in the first stage of labour suffering from eclampsia. The routine treatment was adopted, the convulsions ceased, and consciousness returned twelve hours after admission. Five hours later she had a normal delivery, with no surgical interference whatever, of a full-term infant. Twelve hours later only a faint trace of albuminuria persisted. After twenty-four hours the patient suddenly collapsed, and died with symptoms suggestive of serious intra-abdominal mischief.

Post-mortem.—The original placental site situ-

ated at the fundus of the uterus was in a gangrenous condition and had yielded, leaving a large aperture. The specimen was submitted to the pathologist, who could render no aid in arriving at its causation.

Cancer.—A very pronounced feature of the cases admitted during 1917 was the comparatively early age at which they became victims of the disease. The ages in years were: 26, 32, 34, 44, 45, 46, 48, 49, 50, 64, average, 43.9 years. Early surgical treatment alone offers any possibility of obtaining relief or cure.

Operations.—These numbered 1,006 during the year.

Injuries.

A. Bullet Wound penetrating Intestine.—Laparotomy—suturing of bowel. A young East Indian, aged 23 years, was admitted to hospital at 8.40 a.m. with the history that he had been shot about 9 p.m. the previous night. On admission his general condition and pulse were bad, but with continuous saline infusion *per rectum* he improved. Under ether anaesthesia his abdomen was opened, and revealed the fact that the bullet had entered behind in the lumbar region to the right of the spinal column, penetrated into the abdominal cavity to the right of the ascending colon, perforated the small intestine (ileum) in two places, and lodged in the anterior abdominal wall (right rectus muscle). The bullet was extracted, the wounds in the intestine closed by sutures, the abdomen washed out and drained. The wound of entrance, posteriorly, was slow in closing; otherwise his recovery was uneventful.

B. Penetrating Wound of Abdomen.—Protrusion of bowel—reduction and repair. A boy, aged 11 years, was brought twenty miles to hospital with a wound of the abdominal wall above the bladder through which two feet of small intestine were protruding, caused by falling on the broken branch of a tree. Under chloroform the gut was cleansed, returned to the abdomen, and wound closed. A mild peritonitis, which subsided after the removal of a few sutures for drainage, developed. He left hospital well six weeks later.

C. Incised Wound of Chest Wall.—Protrusion of lung—reduction, &c. An elderly East Indian woman was admitted in a semi-collapsed and very dyspnoeic condition with an incised wound on the left side of her chest cutting through the seventh and eighth ribs into the pleural cavity, a portion of lung bulging through the wound. The lung and pleural cavity, which latter contained a quantity of blood and clots, were irrigated with Dakin's solution, the lung restored, and a firm pad applied. Forty-eight hours later Carrel's method of irrigation was commenced. The patient also had other severe incised wounds, one of which had divided her right clavicle and another cut through the shoulder-blade into the shoulder joint. These latter were treated with the "Bipp preparation." All her wounds healed very rapidly.

D. Rupture of Spleen.—Laparotomy—Tamponage. A moderately nourished East Indian was

RETURN OF DISEASES AND DEATHS IN 1917 IN THE COLONIAL HOSPITAL, SAN FERNANDO HOSPITAL
AND THE DISTRICT AND YAWS HOSPITALS.

Trinidad.

GENERAL DISEASES.

	Admis- sions	Deaths	Total Cases Treated
Alcoholism	13	—	13
Anæmia	36	5	33
Anthrax	—	—	—
Beriberi	2	—	3
Bilharziosis	—	—	—
Blackwater Fever	—	—	—
Chicken-pox	12	—	12
Cholera	—	—	—
Choleraic Diarrhœa	—	—	—
Congenital Malformation	—	—	—
Debility	100	21	102
Delirium Tremens	—	—	—
Dengue	—	—	—
Diabetes Mellitus	26	6	25
Diabetes Insipidus	—	—	—
Diphtheria	15	4	16
Dysentery	188	46	192
Enteric Fever	392	86	413
Erysipelas	5	0	6
Febricula	—	—	—
Filariasis	16	1	17
Gonorrhœa	220	—	226
Gout	—	—	—
Hydrophobia	—	—	—
Influenza	10	—	11
Kala-Azar	—	—	—
Leprosy	—	—	—
(a) Nodular	9	—	9
(b) Anæsthetic	11	—	11
(c) Mixed	9	—	9
Malarial Fever—	—	—	—
(a) Intermittent	—	—	—
Quotidian	—	—	—
Tertian	652	24	667
Quartan	—	—	—
Irregular	—	—	—
Type undiagnosed	—	—	—
(b) Remittent	61	—	65
(c) Pernicious	124	21	132
(d) Malarial Cachexia	70	5	70
Malta Fever	—	—	—
Measles	1	—	1
Mumps	—	—	—
New Growths—	—	—	—
Non-malignant	—	—	—
Malignant	6	2	6
Old Age	107	23	90
Other Diseases	315	85	340
Pellagra	11	6	12
Plague	—	—	—
Pyæmia	1	—	1
Rachitis	—	—	—
Rheumatic Fever	—	—	—
Rheumatism	121	3	132
Rheumatoid Arthritis	18	1	19
Scarlet Fever	—	—	—
Scurvy	1	—	1
Septicæmia	6	4	6
Sleeping Sickness	—	—	—
Sloughing Phagedæna	—	—	—
Small-pox	—	—	—
Syphilis	—	—	—
(a) Primary	33	1	36
(b) Secondary	84	—	85
(c) Tertiary	108	13	117
(d) Congenital	24	8	15
Tetanus	23	11	21
Trypanosoma Fever	—	—	—
Tubercle	16	13	16
(a) Phthisis Pulmonalis	—	—	—
(b) Tuberculosis of Glands	—	—	—
(c) Lupus	—	—	—

GENERAL DISEASES—continued.

(d) Tabes Mesenterica	—	—	—
(e) Tuberculous Disease of Bones	—	—	—
Other Tubercular Diseases	—	—	—
Varicella	—	—	—
Whooping-cough	—	2	2
Yaws	1506	14	1679
Yellow Fever	—	—	—

LOCAL DISEASES.

Diseases of the—			
Cellular Tissue	561	7	616
Circulatory System	—	—	—
(a) Valvular Disease of Heart	84	35	117
(b) Other Diseases	196	64	204
Digestive System—	—	—	—
(a) Diarrhœa	321	99	333
(b) Hill Diarrhœa	—	—	—
(c) Hepatitis	4	—	6
Congestion of Liver	4	—	4
(d) Abscess of Liver	20	6	21
(e) Tropical Liver	—	—	—
(f) Jaundice, Catarrhal	5	2	5
(g) Cirrhosis of Liver	186	91	197
(h) Acute Yellow Atrophy	—	—	—
(i) Sprue	—	—	—
(j) Other Diseases	789	96	814
Ear	40	—	411
Eye	257	—	241
Generative System—	—	—	—
Male Organs	821	21	832
Female Organs	557	31	578
Lymphatic System	87	1	91
Mental Diseases	92	—	94
Nervous System	253	56	272
Nose	36	9	40
Organs of Locomotion	216	5	228
Respiratory System	933	215	981
Skin—	—	—	—
(a) Scabies	—	—	—
(b) Ringworm	1	—	1
(c) Tinea Imbricata	—	—	—
(d) Favus	—	—	—
(e) Eczema	15	—	15
(f) Other Diseases	648	23	703
Urinary System	645	204	680
Injuries, General, Local—	158	13	161
(a) Striasis (Heatstroke)	—	—	—
(b) Sunstroke (Heat Prostration)	3	—	3
(c) Other Injuries	662	24	684
Parasites—	4	—	4
Ascaris lumbricoides	24	3	24
Oxyuris vermicularis	—	—	—
Dochmimus duodenalis, or Ankylostoma duo- denale	755	72	792
Filaria medinensis (Guinea-worm)	5	1	5
Tape-worm	—	—	—
Poisons—	—	—	—
Snake-bites	1	—	1
Corrosive Acids	1	—	1
Metallic Poisons	5	1	5
Vegetable Alkaloids	3	1	3
Nature Unknown	—	—	—
Other Poisons	84	2	84
Surgical Operations—	—	—	—
Amputations, Major	277	7	277
Minor	899	20	899
Other Operations	1192	8	1212
Eye	—	—	—
(a) Cataract	6	—	6
(b) Iridectomy	—	—	—
(c) Other Eye Operations	10	—	10

admitted from Couva with a history that a cart wheel had passed over his abdomen. On admission he showed signs of intra-abdominal hemorrhage, and a weakening pulse. Laparotomy was performed under chloroform and ether anaesthesia, and the abdominal cavity was found to contain a large quantity of blood which was washed out. The spleen—the source of the hemorrhage—had two rents situated on the posterior border. These were plugged with a large sterilized cloth, the end of which was brought through an incision at the left subcostal margin in a similar manner to the method adopted with the successful case described in my last year's annual report. Five days later, adhesions having formed, the cloth was removed and a drainage tube substituted. The wound subsequently suppurated, but eventually healed completely.

Intestinal.

A. Intestinal Obstruction—Volvulus.—Laparotomy. A well-nourished woman, aged 25 years, was admitted with a history of intestinal obstruction of five days' duration. Laparotomy revealed a general peritonitis with volvulus of the small intestine, causing extensive thrombosis of the mesentery. A small portion of the omentum which was gangrenous had to be excised, after which her abdomen was washed out and drained. Her recovery was uninterrupted.

B. Intestinal Obstruction—Bands.—Laparotomy. An ill-nourished woman was admitted with the history of chronic intestinal obstruction becoming acute. Five years previously she had been operated upon for a ruptured ectopic pregnancy which had been followed by general peritonitis necessitating drainage. Laparotomy demonstrated the presence of numerous bands of adhesions between the coils of intestines, while one portion of the small intestine which was constricted in two places was becoming gangrenous. This portion was resected, the gut reunited with a Murphy's button, and many of the adhesions divided. Apparently paresis supervened as no action of the bowel resulted; the gut with button was therefore examined, a leakage found to have occurred, the button removed, and an artificial anus instituted. Immediate relief was obtained, but though the patient improved, she relapsed and died eleven days later apparently from ashenia.

C. Acute Intestinal Obstruction—Hernia reduction "en bloc."—Laparotomy. A man, aged 39 years, was admitted with a strangulated inguinal hernia which was reduced by taxis. The symptoms of intestinal obstruction persisted, however, and laparotomy had to be resorted to. The abdomen contained much bloody effusion and a portion of small intestine which had been reduced "en bloc." An incision had to be made into the distended bowel to allow of the escape of some faeces and gas before reduction could be effected. After closing the wound in the gut with sutures, the abdomen was washed out and closed. He was discharged well one month later.

D. Strangulated Inguinal Hernia in a Female with Reduplicated Sac.—A stout woman, subject to mitral stenosis, was admitted with a strangulated inguinal hernia. With cocaine anaesthesia the sac was exposed and found to have a double sac. A piece of omentum which was gangrenous had to be excised. Her convalescence was rapid.

E. Artificial Anus.—Closure and restoration to normal. This patient had been operated upon the previous year for general purulent peritonitis secondary to a ruptured pyosalpinx. Her condition later was so critical in consequence of the development of "ileus" that a temporary artificial anus was made, and she gradually improved.

Under stavaine anaesthesia (five months later) the adhesions around the artificial anus were separated from the abdominal parietes, and the opening in the bowel closed by two layers of sutures. The bowel was reintroduced into the abdomen and the abdominal wound repaired and closed. Her recovery was excellent, and she gained rapidly in weight.

F. Idiopathic Dilatation of Colon.—Laparotomy. This very rare condition presented much difficulty in arriving at a diagnosis. A young girl, aged 13 years, was recommended to hospital for removal of a firm tumour in her lower abdomen. She had also a severe ankylostomiasis infection which necessitated prolonged treatment, after which her general condition rapidly improved. The tumour, which was mobile, could be pushed upwards to the liver and downwards into the pelvis. On opening her abdomen she was found to have a congenital dilatation of the descending colon, the apex of the dilatation being occupied by a large mass of impacted faeces. This was massaged downwards and the abdomen closed. No re-accumulation had occurred previous to her discharge from hospital.

G. Ruptured Duodenal Ulcer—General Peritonitis.—Laparotomy. This man was admitted at 1.30 a.m. with the history of no action of the bowels for four days. His abdomen was very distended, pulse 104 and irregular, while vomiting and hiccoughs were persistent symptoms. At 4 a.m. his abdomen was opened, and a generalized peritonitis of an ulcer in the duodenum near the stomach was discovered. After flushing out the abdomen with saline solution, the perforation was tightly plugged with gauze, and the upper end of the wound lightly packed with gauze around a drainage tube. Three days later the plug came away and a second one inserted. Six weeks later the wound had completely healed.

H. Enteric Fever with Acute Gangrenous Appendix (perforation) and Peritonitis.—Appendicectomy and drainage. A moderately nourished East Indian was admitted from Couva with general purulent peritonitis. Laparotomy revealed a gangrenous appendix which had ruptured. The appendix was removed and the abdomen drained, but without averting a fatal issue.

Post-mortem.—There was present in addition enteric ulcers of the small intestine.

Gynæcological.

A. *Extra-uterine or Ectopic Pregnancies*.—Six cases. (i) An East Indian was admitted with a history suggestive of an extra-uterine pregnancy. Laparotomy was performed, and the right Fallopian tube was found to contain a sac with blood clots and an eighth week old fetus. From a small rupture in the tube blood was oozing into the abdomen. The affected tube was ligatured and removed. Her recovery followed.

(ii) An East Indian was admitted with the misleading history that after two months amenorrhœa she had an abortion ten days previous to admission. *Per vaginam*—a tumour connected with the left broad ligament could be palpated. Laparotomy revealed the fact that the fluid accumulated was shut off entirely above from the abdominal cavity, the peritoneal covering of the pelvis being lifted upwards. The abdomen was closed, and *per vaginam* the cystic cavity opened into through the posterior fornix, and was emptied of its putrefying fetal elements, evacuated, and irrigated through a small Bozemann's intra-uterine canula. She was discharged well six weeks later.

(iii) This was a very similar case to the last, and was treated in the same manner with a like result.

(iv) An intensely anæmic woman was admitted with the history of three months amenorrhœa, succeeded by a profuse and prolonged menorrhagia. Her temperature was 103·8° F., pulse 132, and abdomen distended. Laparotomy showed her peritoneal cavity to be full of blood and clots, the result of a left tubal pregnancy which had ruptured. After salpingectomy of the affected tube, her abdomen was filled with saline and she slowly improved. Eight days later she developed a thrombosis of her left femoral vein, and the next day suddenly exhibited symptoms of an embolism of the lung which caused her death.

Post-mortem.—A well-marked embolism was found cutting off almost the entire blood supply to the right lung.

(v) This patient was admitted from Erin with apparently general peritonitis, a thick purulent vaginal discharge, and a history of regular menstruation with abdominal pains of four weeks duration. The evidence, therefore, pointed to a ruptured pyosalpinx with peritonitis. Her temperature was 103·8° F. Pulse thready and very fast. Laparotomy demonstrated a rupture in the left broad ligament leading into a hæmatoma between its layers. The left tube contained a sac which evidently some time previously had ruptured downwards between the layers of the broad ligament; the latter of which had given way at a more recent date into the general peritoneal cavity, the blood clots and effusion, in which were semi-purulent. Salpingectomy and drainage came too late, however, to save her life.

(vi) The last case was that of an East Indian who was admitted with a history of an abortion, but showed symptoms of intraperitoneal hæmorrhage. Laparotomy confirmed the source of the

hæmorrhage to be a ruptured left tubal pregnancy. Salpingectomy was carried out. For twenty-four hours her condition remained critical, after which she rapidly proceeded to recovery.

The presence of advanced ankylostomiasis in a very large proportion of East Indian women, together with the misleading history of an abortion, renders it a matter of extreme difficulty to decide in some cases whether the patient is suffering from a leaking ectopic pregnancy, or merely a severe ankylostomiasis infection with intense anæmia, slight ascites, and a recent abortion.

As failure to diagnose a ruptured ectopic pregnancy means certain death for the patient, it is now my invariable practice in such doubtful cases to infiltrate the middle line of the abdomen below the umbilicus for a distance of 2 in. with a local anæsthetic. A small painless incision is then made dividing the tissues down to and exposing a small area of the peritoneal sac, a minute incision into which at once demonstrates whether its contents is serous or hæmorrhagic. In the former case a trocar can be inserted and its contents evacuated; in the latter a general anæsthetic is at once administered and the major operation proceeded with.

B. *Hysterectomy—Uterine Fibroids*.—The only case which ended fatally is of interest in demonstrating the difficulty which is sometimes encountered when arriving at a decision with regards to operative interference. An ill-nourished woman was admitted in an intensely anæmic condition suffering from severe menorrhagia due to uterine fibroids, and which completely incapacitated her from pursuing any vocation. In spite of prolonged treatment for many months in hospital, it was found impossible to completely overcome the anæmia in consequence of the very profuse menorrhagia which still continued on an average for two weeks during each month. It was therefore eventually decided to operate shortly before an attack was expected when her condition was at its best. Subtotal hysterectomy was performed. Towards the end of the operation she showed signs of collapse, but rallied. After coming out of the anæsthesia she exhibited symptoms suggesting delayed chloroform intoxication (coffee ground vomitus, &c.), a consequence apparently of the anæmic condition of her blood, and succumbed eight hours later.

C. *Bicornuate Uterus—Laparotomy—Salpingectomy*.—A young girl, aged 17 years, was admitted with the history of a uterine tumour increasing in size. She was kept under observation in hospital, and as her menstruation was quite regular laparotomy was performed. A large cyst involving the terminal portion of the right Fallopian tube (whose contents had all the characteristics of retained menstrual fluid) was excised. Her uterus was bifid, the cleft which hemisected the organ extended down almost to the lower uterine segment. Her abdomen was then closed, and she has been kept under observation, but no recurrence of a blockage has been observed.

Colonial Medical Reports.—No. 98.—Trinidad and Tobago
(continued).

*D. Congenital Absence of Cervix.—Atresia Uteri.—Hysterectomy (partial).—*The case was unique in many respects.—A young woman, aged 26 years, was admitted to hospital with a uterus enlarged to about the size of a five months' pregnancy. Her history was that at the age of puberty it was noticed that her condition was not normal as she never menstruated via the vagina, but always and regularly via the rectum. As she suffered no inconvenience otherwise and her health never suffered she never sought medical advice. Six months before admission to hospital all menstruation ceased, even via the rectum, a tumour developed which became progressively larger and more tender, while her health suffered considerably, and she began to get thin. Examination *per vaginam* revealed an hourglass-shaped vagina with a perfectly smooth dome and entire absence of any cervix; while bimanually the tumour above was found to be a distended uterus.

Under chloroform her abdomen was opened, and the uterus was found to have been converted into a huge thin-walled cyst very much thinner at the upper (fundal) extremity; on the antero-superior aspect it was adherent to the bladder, surrounded by omentum and commencing to leak. The entire dilated and attenuated portion was excised down to the openings of the Fallopian tubes until healthy uterine tissue was reached. The two halves of the uterus were then sutured together with two layers of sutures until the uterus was restored to about its normal size. A drainage tube was then inserted down to the bottom of the Pouch of Douglas, as it was impossible to avoid a certain amount of contamination of the peritoneal cavity with the contents of the uterus, which consisted of retained menstrual fluid. After closing the abdominal wound, an artificial opening was made through the roof of the vagina into the lower segment of the uterus.

The abdominal wound eventually healed completely, and the patient presents herself periodically to have the artificial opening dilated, and through which she now menstruates regularly. She has gained considerably in weight, and her health has been quite restored to normal.

E. Suppurative Salpingitis with General Purulent Peritonitis.—Three cases were admitted with the classical signs of general purulent peritonitis.

Two cases were treated by laparotomy and drainage of the abdominal cavity suprapubically, of which one ended fatally. The third case was treated by drainage of the abdomen through the vagina (postero copotomy) with a successful result.

F. Ruptured Dermoid Cyst with General Purulent Peritonitis.—Ovariectomy.—This case, which ended fatally, was admitted from Erin in an almost moribund state. Laparotomy with excision of the cyst and drainage only succeeded in postponing her death thirty-six hours. *Post-mortem*, her kidneys were found to be cystic.

G. Ruptured Ovarian Abscess with General Purulent Peritonitis.—The condition of this patient on admission was found to be very similar to the previous case. Laparotomy revealed the cause to be an abscess of the ovary which had burst. Removal of the diseased organ with drainage ended in recovery.

During the year very gratifying results have been obtained in the treatment of septic wounds, especially compound fractures, by either a modified Carrel's method of irrigation with Dakin's solution or by the application of Rutherford Morrison's "Bipp" paste. The former is utilized in very purulent cases, and the latter when the sepsis is slight.

E. A. TURPIN,
Resident Surgeon.

March 3, 1918.

REPORT ON THE LUNATIC ASYLUM.
ST. ANN'S ASYLUM,
TRINIDAD.

Admissions, Discharges, Deaths.—The admissions were forty fewer than in the previous year, the decrease being nearly equally divided between the sexes. Inquiry into the history of the admissions disclosed that (a) only seventeen were known to be relapsed cases; (b) the duration of mental disorder before admission had probably not exceeded three weeks in over 50 per cent. of the cases; (c) insane heredity or obvious congenital defect existed in 45 per cent., the real proportion being probably much higher; (d) alcoholism and mental stress (not apparently due to war conditions) were the chief exciting causes of the mental disorder.

The proportion of relapsed cases among the admissions continues to diminish—probably a result of the tendency of recent years to bring mental disorder earlier under asylum treatment, leading in many cases to more stable if not earlier recovery. It is, however, the number of "first attack" cases which affords the real index to the incidence of insanity in a community, and although there were thirty-one less than in the previous year, the average of the past three quinquennial periods shows no tendency to decrease, the extent to which inherited predisposition enters into causation being rather more marked each period.

The percentage of recoveries on admission was the highest since 1909. This increase which was more marked among the females may be attributed to the more favourable character of the admissions during the past two or three years. In more than half of the recoveries the duration of residence in the institution exceeded eighteen months. It is impolitic to regard mere subsidence of mental disorder as recovery or fitness for discharge. The benefits of prolonged treatment in the institution associated with regular hours and freedom from responsibility are reflected in a reduced relapse rate.

The deaths numbered 86 and included 28 from pulmonary tuberculosis and 11 from dysentery (colitis).

In spite of the occurrence of mild chicken-pox among the patients and staff and of 4 cases of typhoid fever the general health of the institution was fair.

ANNUAL REPORT OF THE COCORITE LEPER ASYLUM.

On December 31 the population of the asylum was 502 souls, consisting of 304 men, 32 boys, 140 women, and 26 girls.

The water supply is efficient and the water of good quality and ample.

The usual fevers, bronchial and gastro-intestinal affections occurred. There were several cases of chicken-pox among the children and one case of yaws.

One birth from a leper mother outside and one inside are noted. Both children were born healthy.

CHARLES W. HOWATSON,
*Medical Superintendent,
Cocorite Leper Asylum.*

REPORT ON THE ST. AUGUSTINE YAWS HOSPITAL. YAWS HOSPITAL, ST. AUGUSTINE.

The water supply and drainage are both unsatisfactory. A large sum is paid annually for water,

whereas the large roof of the hospital could supply all that is needed if a cistern were built.

Concrete drains are needed in front of the building.

There were 1,203 admissions during 1917, and the number admitted since the opening of the hospital is 11,596.

Deaths, 13—from the following causes—Tuberculosis, 1; dysentery, 5; abscess and anæmia, 1; meningitis, 1; worms, 1; dysentery and Bright's, 1; influenza, 1; senility, 1; cardiac failure, 1. Two of these cases were not injected. Two deaths, one from abscess and the other from meningitis, I think were results of the injection.

There was an epidemic of varicella, which started in January and ended in August. The total number of cases was 156. If there were proper means of isolation it is probable that the epidemic would have been checked earlier. Five lepers were admitted and subsequently transferred to the leper asylum.

1,291 injections were done during the year. Of this number 1,012 with arseno-billon and 279 with diarsenol. No kharsivan was supplied.

There were ninety-six relapses during the last year.

J. ALDRIC PEREZ,
D.M.O., St. Joseph.

REPORT ON THE HEALTH AND SANITATION OF KHARTOUM, KHARTOUM NORTH AND OMDURMAN, DURING THE TWELVE MONTHS ENDING SEP- TEMBER 30, 1917.

By **L. BOUSFIELD, M.A., M.D.Cantab., D.P.H.,**

Medical Officer of Health.

GENERAL HEALTH.

The general health of the population has been most satisfactory, and this view is upheld by the recorded death-rate falling from 16.5 per 1,000 living last year to 12.8 per 1,000 this year.

There have been no epidemics of the more serious diseases, except a small outbreak of small-pox, which looked at one time as though it might expand into an extensive epidemic.

There was a large increase in the locally-acquired malarias owing to a high Nile and good rains, though a third of the cases were due to a native wood-hoat bringing in many infected anophelines.

This year the Nile was higher by 10 centimetres than the one of 1908, the previous highest since the re-occupation; it caused considerable damage to native buildings and crops, but was beneficial in bringing areas, not usually flooded, under cultivation.

The general sanitation of Khartoum and Khartoum North remains satisfactory, but no special improvements have been undertaken owing to lack of funds and the excessive price of materials.

SANITARY LEGISLATION.

Regulation for the control of butchers, milk and water sellers, and mineral and ice manufacturers were redrafted.

The regulations for the prevention of breeding of mosquitoes were amplified, and an application has been made to legally enforce the registration of prostitutes and brothel-keepers, and it is hoped this will be made law, as the prevalence of venereal diseases is very considerable.

STAFF.

The British staff remains the same.

The anti-malarial staff has been increased by two native headmen and seven men; these were very hard-worked during the high Nile and have also enabled much more extensive work to be undertaken, and though their efforts may not affect the statistics of Khartoum, they will greatly benefit the health of Omdurman and surrounding villages, and will be an extra safeguard to Khartoum.

BUILDINGS AND EQUIPMENT OF SANITARY DEPARTMENT.

New offices for the British sanitary inspectors have been built in Khartoum and provide a much-needed improvement.

A shed has been converted into a good motor ambulance house.

A new sanitary compound has been built at Khartoum North and will eventually contain offices, store-houses, repair shops, stables, &c., and so all the various branches will be under better control.

An excellent petrol launch has been granted and has supplied a great want with regard to anti-malarial work and is also capable of taking three lying down patients.

A motor ambulance was granted, but as the Egyptian Army kindly offered the loan of one until it should be required for army purposes, it was not supplied; unfortunately, the Army had to withdraw the ambulance in September, and so far another in its place has not been supplied.

The incidence for the locally contracted notifiable diseases was as follows: Khartoum, 12.9 per 1,000; Khartoum North, approximately 9 per 1,000; Omdurman, the statistics are so unreliable that they are not given. Egyptian Army troops, 22 per 1,000; British troops, 27 per 1,000.

The Army returns are correct for the numerous diseases made notifiable in the municipality, and as so many minor diseases are included it is probable that the true incidence amongst the civil population is about 33 per 1,000, for undoubtedly many cases of chicken-pox, measles, mumps, and whooping-cough, together with mild attacks of dysentery and malaria are not reported by the natives.

Special notes are submitted on the following diseases:

Cerebrospinal meningitis.—Only six cases were reported, five of which were locally contracted, four coming from the military population.

All were sporadic, and the local cases were distributed thus: Khartoum, three, Omdurman, two.

The meningococcus was demonstrated in all cases. The approximate ages were 35 (three), 21, 20 and 14. Five were males and one female. The death-rate was 83.3 per cent.

During the last five years the number of locally-acquired cases have been: 1913, 10; 1914, 60; 1915, 102; 1916, 23; 1917, 5.

In 1915 the disease was epidemic throughout large districts in the Sudan, and this disease, together with dysentery, undoubtedly increased the local recorded death-rates for 1914, 1915, and 1916.

Dysentery.—Of 111 notified cases, 65 were considered to have contracted the disease locally, though, as with malaria, it is most difficult to ascertain in many cases where infection actually took place.

Of the local cases 34 were civil, 26 Egyptian Army, and 5 British troops. All were amœbic in type and in all, except three, the amœba or its cysts were demonstrated microscopically.

The local incidence for Khartoum is 1.3 per 1,000;

Khartoum North, 1.7 per 1,000; Egyptian Army, 0.6 per cent.; British troops, 0.59 per cent.

The Nationalities were: Europeans 13, Egyptians 58, and Sudanese 40. The age incidence was: under 10, 4; 10-20, 9; 20-30, 36; over 30, 23. The sex incidence: Males, 104; females, 7. The case mortality was 1.8 per cent.

The locally-contracted cases during the last six years are as follows: 1912, 13; 1913, 19; 1914, 107; 1915, 105; 1916, 72; 1917, 65.

Amœbic dysentery is no doubt fairly prevalent amongst the native populations, and these figures do not indicate by any means the number of cases actually present, but it is certain that they indicate that the disease is not extensively present.

The excess of male over female cases is due to many males being in Government employment and therefore reporting or being sent sick and also to the reluctance of the native to send the females of the family for medical treatment.

The prevalence of the disease during 1914 and 1915 was probably due to the high price of food causing many of the poorer classes to go on short commons.

From observations during the last five years, the dysentery curve has been noted to rise rapidly and reach its maximum during the month of September, and the two preceding months are usually characterized by rain, increased humidity of air, a cooler atmosphere, marked increase in the sub-soil water level and by an increase in flies, all conducive to lengthen the external life of the cysts and of their carriage to others.

Leprosy.—Nine cases were reported, all contracted elsewhere. The settlement at Omdurman contains nineteen indigent lepers, who are well housed and better clothed and fed than if they were allowed out, and are also prevented from being a danger to the general public.

At the end of 1916, as funds were getting very low, a general appeal was sent out and was answered generously by the official population. I regret to say none of the local wealthy native merchants subscribed a millimo, though all the lepers are natives of the Sudan.

Personally I consider the settlement should be supported by Government more than it is at present and not by private charity and not from local funds entirely, as more than one-third of the cases come in from other places, presumably because the capital is the best and most paying hegging centre.

The lepers owe much to the interest and care bestowed on them by Mr. Craig, Senior Inspector, Omdurman, and Dr. Lloyd of the Church Missionary Society.

A leper's wife has been taught the elementary care and cleansing of ulcers, and has been supplied with a box fitted with antiseptics and simple dressings, so that daily attention can be given if necessary.

Malaria.—Of the 707 cases (including 5 cases of imported black water fever) 160 were considered to have been locally acquired.

The figures for the last six years for the locally-acquired and imported malaries in Khartoum and Khartoum North are:—

MALARIA.

Year	Local	Imported	Year	Local	Imported
1912 ...	75	41	1915 ...	74	354
1913 ...	47	48	1916 ...	7	114
1914 ...	68	166	1917 ...	124	547

It will be noted that except in 1912 and 1913 the local cases bear a distinct proportionate relation to imported cases; this is not by any means entirely accounted for by better notification. This considerable increase, however, only represents a total incidence of approximately 0.4 per 1,000, and was caused by: (1) A high and above all maintained Nile producing flooding of large areas of cultivated lands with the consequent formation of marshes and pools. (2) The arrival early in December from the Blue Nile of a native boat, loaded with wood infested with highly-infective anophelines. This boat evaded calling at the mosquito clearance station. (3) The great prevalence of the anopheline mosquito. It appeared as though, quite apart from the fact of there being many suitable breeding places within a radius of four or five miles, that last autumn was especially favourable to their propagation. (4) The great prevalence of malaria elsewhere, as indicated by the great increase in imported cases.

The records show that of 707 cases, 671 were microscopically examined (a very great improvement on previous returns) with the following results: "Positive" return, 487; benign tertian, 64 (includes 54 from British troops); malignant tertian, 52; quartan, 1; "Negative" result, 67.

Of the 160 locally-acquired cases microscopical notes were received on 144, which gave: Positive, 106; benign tertian, 6; malignant tertian, 26; negative, 6.

The monthly incidence of the local malaria in Khartoum and Khartoum North was—October, 2; November, 30; December, 41; January, 36; February, 3; March, 1; April, 1; May, 4; June, 1; July, 2; August, 0; September, 2. Thus of the 124 cases, 107 occurred in November, December and January. The case mortality of all cases, local and imported, is 0.3 per cent.

An increased anti-malarial staff has been granted to more effectively deal with incoming steamers and boats, river pools at greater distances away, more of the pump irrigated lands and also to form a mosquito quarantine station on the Blue Nile.

At the end of September and early October, the prospects of an extensive malarial outbreak looked extremely ominous; fortunately, however, the river started to fall rapidly on September 28th, and continued to go down, and the extensive flooded areas, which were already badly infested with culex and anopheline larvæ, dried out, and with energetic draining, baling, pumping and the free use of larvicide or oil, most of the areas were free by October 21.

The local breeding can be kept within negligible quantities, though the extensive farms are a perpetual source of worry as they represent many thousands of acres, and small breeding places can be so easily missed; further, the formation of river pools is also often very extensive, reaching many thousands during the river's fall, pools varying both in number and site from year to year, as the sand and mud banks appear in various places annually.

The greatest danger is in the imported imago mosquito by steamers, native boats and trains from highly-infested areas; this problem is by far the most difficult to solve.

The number of mosquitoes introduced by steamers and boats in cargoes and holds, which cannot be approached on account of overlying cargo is very considerable, and this year we have tried to bolt them at the mosquito clearance station by non-poisonous smoke generated by a smoke machine.

Experiments have proved that they can be bolted, but the method has not been extensively employed owing to our being able to manufacture only one fairly satisfactory machine locally; it has been so far impossible to get machines made or delivered owing to the war.

There appear to be no records of the heights of the rising Nile at which various local areas become flooded, and so to put on record a chart or diagram has been drawn up, the former showing the heights of the river and the areas flooded, and the latter giving an idea of areas flooded, at 16.83 metres, adjacent to Khartoum.

The heights given are only approximate as the area is extensive, and is compiled from notes made by myself of the days when flooding occurred, and of course not to the exact height of the river, but from that recorded by the Irrigation Department for the day.

It should be noted that when the river was recorded at 16.83 the water was lapping up to and partially over the metalled road opposite the Egyptian Army Military Hospital, while the level at this part of the bank is recorded at 17.05; it certainly appeared that water at 17.05 would have flooded the road to some 6-8 in. in depth. I do not know if the datum of the two levels is the same.

The houses between the P.M.C.'s house and the Gordon College showed dampness rising for some two feet or more up the walls from the foundations. The natives state that such a high Nile has not been experienced for twenty-five years, the recent big floods being 1908 to 16.73, 1916 to 16.60 and 1917 to 16.83.

The mosquito problem was easier this year than last and has proved that it is not so much the height of the river as its continued maintenance that is to be feared.

It should be noted that at 16.60 in 1916, the Burri Plain was not flooded, while in 1917 at 16.63 an extensive lake, finally extending nearly 1½ miles long, was formed.

With careful attention this flooded area should cause very little malarial danger, while the land brought under cultivation is, of course, of enormous value to the adjacent villages, and so I would recommend another year opening a gudwal, if the river rises to say 16.50 so as to flood this area. In 1916 a small channel of 50 yards in length and a foot and a half in depth would have brought under cultivation a very large number of acres, a most valuable asset in a district where the rainfall cannot be depended upon, and, in my opinion, a benefit which would more than counterbalance the slight risk of a few cases of malaria.

Colonial Medical Reports.—No. 99.—Khartoum and Omdurman (continued).

I would again point out that the Civil Hospital at Khartoum and the British Military Hospital have no mosquito proof wards for the treatment of malarial cases; though the Sanitary Department usually keep down mosquitoes to a negligible quantity, yet at abnormal times mosquitoes may appear, and there may occasionally be a missed breeding place, while against the imported adult insect we are practically powerless to deal with certainty, and for these reasons, I consider malarial cases should be treated in mosquito proof rooms.

A special note is required on malaria amongst the British troops, as this year 75 cases were notified, especially as the records of the three previous years only showed 14, 23 and 4 respectively. Of these 75 cases, only 15 were considered to have acquired the disease locally, 18 at other stations in the Sudan, including 6 who were looking after grazing camels at Soba, and the remaining 42 were relapse cases, most having contracted the disease in Egypt at Zagazig, some at Salonika, Mudros, India, &c.

The reasons for considering these as relapse cases are as follows:—

(1) Many gave histories of short bouts of fever in Egypt, necessitating a few days' hospital treatment, some being definitely diagnosed as malaria. Apparently none received quinine treatment for more than a few days.

(2) Some went ill with malaria the day of or day following arrival.

(3) Many went ill at a period when practically no other cases were locally acquired, for while during March to September only eleven local cases in Khartoum and Khartoum North were notified in a population of about 40,000, yet the British troops during this period supplied 49 cases, all except one being benign tertian.

(4) Many cases appeared at a period when no mosquitoes were noted, and when it was unlikely that breeding places would be missed.

On several occasions specially arranged "check" examinations by an extensive staff were undertaken and no missed breeding places found in or around harracks.

(5) From previous experience, it has been noted that the vast majority of the locally-contracted cases amongst the British troops are of the subtertian variety, due, in all probability to infective mosquitoes coming from craft arriving from the Blue Nile, where malignant malaria is the commoner type, while fifty-four of the British cases were definitely proved to be benign tertian. Further, many of these cases showed many more gametes than rings in the peripheral blood when first reporting sick, proving chronicity of the disease.

The total incidence amongst the British troops was 8.9 per cent. and the local incidence 1.9 per cent. calculated after subtracting the imported cases from the average strength present during the year.

The mortality was nil.

Microscopical examinations recorded were: fifty-four benign tertian and eighty-seven malignant tertian.

Puerperal Fever.—During 1915 and 1916 there were twelve cases of puerperal fever at Omdurman, which appeared to have been largely due to the carelessness of the native midwives.

The subject was taken up with the Director, Medical Department, and greater supervision was given, and the Director published some usual instructions and rules for the midwives.

On a puerperal case occurring, the proceedings of the midwife were carefully investigated, and if there was evidence of carelessness or failure to carry out instructions on her part, her licence was either withdrawn or suspended.

This was enforced in some cases and it seems probable that the results of such steps have led to the very satisfactory reduction from twelve cases in 1916 to two in 1917.

Pulmonary Tuberculosis.—During the year thirty-five cases were notified, twenty-two being apparently of local origin.

The deaths (forty six) from pulmonary tuberculosis must not be accepted as absolutely correct, for many are recorded by the sanitary barbers, who judge from symptoms described by the relatives; however they have been warned not to record a death as due to pulmonary tuberculosis unless there is a history of illness extending over months, accompanied by wasting, cough and blood-stained expectoration.

The total number recorded for pulmonary tuberculosis is 91 and 170 for other forms of the disease; this is an improvement on last year's figures, when 51 deaths from pulmonary tuberculosis were registered at Omdurman alone, but the decrease may be due to greater care and discrimination on the part of the sanitary barbers, after the special inquiry last year.

Instructions for phthisical patients have been printed in Greek and Arabic and are being distributed to cases discharged from hospital or treated at home, and an attempt is being made to follow up the cases so as to improve the local hygienic conditions, supply antiseptics and thus reduce the danger to the general public.

My belief is that a sanatorium for advanced cases is needed, not so much for the sake of the individual as for the protection of the public.

Small-pox.—A small outbreak of sixteen cases, with five deaths, occurred between March 6 and June 17. The first, imported from Egypt, occurred in the servant of an Egyptian officer.

The servant was discharged by his master immediately on arrival at Khartoum on February 23, and having no abode, wandered about Khartoum and Khartoum North until March 6, when he was discovered in a public road covered with confluent small-pox; the eruption must have come out about March 3. The patient, isolated at once, was too ill to afford us information as to his movements, and so no satisfactory steps could be taken, but 60 possible contacts were vaccinated. Death occurred on March 13.

Twenty-two days later on March 28, a morasla of a bank developed small-pox which became confluent. He died on April 2. The source of infection could not be discovered, but all contacts in his compound and the bank were vaccinated and kept under supervision.

Again an interval of twenty-five days and on April 22 two cases appeared, coming from a village Deim Abou Hasheish, situated some three miles from Khartoum, but both cases had worked daily, while ill, in Khartoum, one in a Government department, the other in a printing press.

The village was at once visited and inspected and a convalescent small-pox case, a man about 20 years of age, was discovered walking about with most of the scabs off, but many still adherent.

He had undoubtedly been infected some seven to eight weeks previously, and had come into contact with the first case, and thus proved to be the missing link between the first and subsequent cases, for which we had been searching in vain. This man had been visited, while ill, for weeks by numerous friends.

On the 23rd, we found two fresh cases, and two were reported from Omdurman, which, however, on examination, were found to be chicken-pox.

On the 24th, two more cases were discovered, one in a broken-down disused hut, where he had been hidden behind a locked door during our previous inspection; he was covered with small-pox eruption.

The 25th and 26th supplied three more cases from this village.

As far as one could tell, the whole village, of some 800 persons, were contacts, and so it was considered wise to do a general vaccination, and 527 were vaccinated on the 22nd and 23rd, daily inspection of contacts for fourteen days after the last case was carried out, but the village was not quarantined.

General vaccination throughout the three towns and adjacent villages was ordered and carried out for the following reasons: (1) The unknown extent of direct contacts; (2) the hiding of cases by the natives; (3) the prevalence of small-pox in other provinces in the Sudan; (4) the extensive pahalum ready for the disease owing to small-pox not having been prevalent for many years in the past.

During the next few weeks 68,241 vaccinations were performed in the three towns and adjacent villages.

Later in May two more cases developed amongst the military in Khartoum North, and two were imported in June.

It is regretted that a complete record of the previous vaccinations amongst the patients was not kept, but of the five fatal cases, four had never been vaccinated, and the remaining one was last vaccinated many years ago in childhood. Four others were noted to be vaccinated, two being very mild cases and another being the convalescent ambulatory case found in the village.

The case mortality was 31.3 per cent. The average age was 20.9 years and all were males, which is some evidence that small-pox is a contact disease and not air-borne, as nearly all the cases were men of a similar age, who had visited the second case.

The Director, Medical Department, rendered every possible assistance, and our thanks are due to Dr. Lloyd of the C.M.S. Hospital, Omdurman, and also Mr. Craig, Senior Inspector, Omdurman.

Some of the older pupils at the Gordon College helped to carry out the general vaccinations, and

without them the requisite staff could not have been procured; for this help thanks are due to the Assistant Director of Education. These boys were first instructed and then they vaccinated under supervision; in the future this knowledge may be very useful, as they will be scattered throughout the Sudan as native schoolmasters.

There can be little doubt that a serious epidemic was averted, mainly by the energy with which all those responsible attacked the situation, especially as seven out of the sixteen cases did not report sick, but were discovered by the sanitary authorities. All the sick were treated in a tent hospital in the Infectious Diseases Compound at Khartoum North; without a motor-car and motor ambulance this satisfactory result could not have been obtained.

Prosecution for hiding one of the cases in the village was undertaken under the Public Health Ordinance.

Typhoid and Paratyphoid Fevers.—Twenty-six cases were reported, of which eleven were considered to be locally contracted.

The distribution of the "local" cases was: Khartoum two; Khartoum North five; Omdurman four. The military supplied three of these cases.

The records show that three were clinically diagnosed, ten gave positive serum-reaction, and from nine the bacterium was isolated from blood, faeces or urine. The remaining four, all Sudanese, had short attacks of fever, and in spite of repeated negative serological and bacteriological examinations were diagnosed as typhoids. Personally, I think there are no definite grounds for considering these four as typhoids or paratyphoids.

The Nationalities were—British two, Greek one, Syrian one, Sudanese three, and Egyptian fourteen. As usual, there was a marked predominance of Egyptians, owing to the prevalence of these diseases in Egypt.

The Sudanese returns again, as usual, should I consider be very low, for the four cases mentioned belong to this class, and were young boys, and if subtracted reduce the figure to four. Everything points to the fact that the typhoid fevers are rare amongst the local native population at present.

The sex distribution was males twenty-one, females five. The age periods were—1-10 years, six; 10-15, five, including the four very doubtful cases; 15-20, three; 20-30, ten; over 30, two. The average of the recorded ages (excluding the four doubtful cases), was 15.9 years. The case mortality was 3.8 per cent. One patient was found to carry for nearly four weeks after the fever had gone.

During the year, further attempts have been made to prevent the discharge from hospital or private practice of cases of typhoid until three negative results have been returned.

As a possible practicable arrangement these suggestions have been put forward—

First examination of faeces and urine, five to seven days after cessation of fever; second, five to seven days later; third, five to seven days later.

If the case continues to excrete bacilli, the M.O.H. is informed, if it is found impossible to retain the case, and he arranges accordingly.

Venerable Diseases.—The cases included 856 males and 105 females.

The military statistics are far more reliable and accurate than those of the civil population, and from their figures one can judge to some extent the prevalence of these diseases.

The Egyptian Army gives 7 per cent. for all cases and 6·7 per cent. for locally-contracted diseases, while the British troops give 10·5 per cent. for all cases and a local incidence of 7·5 per cent.

Taking the lowest percentage, say 6·5 per cent. and applying it to only one-third of the total population we should get about 3,000 yearly infected locally, and it is quite possible these figures may be equalled or exceeded.

The statistics obtained this year show a satisfactory decrease of 208 on last year's returns, but this is but the first move in a step in the right direction.

Amongst a certain body of men, prophylactic measures were arranged for and warning given them, but though practically none of these measures were employed by the men, it seems highly probable that bringing the subject to the fore did a very great deal of good, for previously the venereal rate was 25 per cent. per annum, while during the last 12 months it has fallen to 8·1 per cent., and this in a body of men numbering 268.

CONSERVANCY.

This is mainly dealt with in the Chief Sanitary Inspector's Report.

The number of buckets in use daily in Khartoum and Khartoum North is 4,808, allowing of but one bucket to every five persons,

In the villages, incineration is carried out.

The workshops have been fully employed—1,321 buckets and lids rebuilt, 23,339 repairs, 132 castings, 4 tank carts and 4 lorries rebuilt, 14 axles made, and the making of and repairs to harness and saddlery; with difficulty we obtained most of the material required, though at very much increased prices.

Every credit is due to the staff for the way the work has been carried out, especially to the Chief Sanitary Inspector, to whose energy and capabilities the origin and working of these shops is mainly due.

Plans for sixteen new latrines were submitted and passed during the year, exclusive of those for new houses.

Arrangements were worked out for the carrying on of the conservancy should Khartoum have become flooded in certain areas, but fortunately there was no need to put them into operation.

A scheme is being prepared for submission after the war for partially replacing animal by mechanical transport, which it is believed, will be less expensive and less dependent on the doubtful labour supply.

SEWAGE FARM.

Adjacent land to the extent of 34,237 feddans has been purchased. The flooded area has been sown with dura, and should supply a good crop of forage for our animals.

For several years we have discarded cultivation as it did not pay, but we make a very good sum by the sale of the soil as a fertilizer to local farmers.

RAT DESTRUCTION.

During the year 1,531 rats were trapped.

We now only employ one rat catcher as we have ascertained by investigation that there are very few *Xenopsylla cheopis* present on the local rats and *Pulex irritans* is unknown, so that extension of plague is highly unlikely.

FLY PREVENTION.

The importance of manure for the "zibla" plaster for the outside of mud houses and also as a fertilizer in this country is very great.

We carried out experiments in December with a pit into which horse manure was put, then watered and well rammed down, each day or so a fresh supply being put in and treated in a like manner. So far, the experiments are far from complete, but this pit was examined on numerous occasions between December and the end of February, and the general results were:—

2½ in. from the surface, many live larvæ; 2½ to 4 in. from surface, all larvæ dead and many dead pupæ. Some of the pupæ, which appeared as though they might be alive, we tried to hatch out but they failed to do so.

In February, which was considerably hotter than December and January, live larvæ were not discovered at a lower depth than 1 in.

If this simple method for keeping manure proves, after further experiments, to be safe from the breeding out of flies, a very valuable asset will be obtained, but it is doubtful if it could be allowed in many instances as care and supervision are needed which the ordinary householder will not take as a rule.

At present all manure is burnt, except at the period before the rains, when it is required for plastering of the houses and when there is usually a great deficiency.

If further experiments prove this method a success it is hoped that we shall be able to deal with the manure on a large scale, which would be most beneficial to farms, gardens, &c., and also be profitable.

HOUSING ACCOMMODATION.

Seventy-one plans were submitted and finally approved. Several compounds containing many houses were altered and partially reconstructed on sanitary recommendation. Fifty-one insanitary dwellings were demolished. Two municipal compounds were greatly improved by the demolition of some houses, allowing light and ventilation to the remainder, and one has had a safe pipe-borne water supply installed.

The infectious diseases compound is very large and should be divided by barbed wire so as to have a compound ready for contacts that need quarantine.

I am informed a separate observation room is to be built at the Gordon College for the reception of boys going sick with illnesses which may turn out to be infectious; up to the present they have always been placed in the detention ward at the school. This has been urged for several years and should reduce the infectious disease incidence amongst the boys.

In the native market, a large number of mat shelters have been allowed to be converted into small mud huts, which do not fall in with the building regulations with reference to floor space, cubic capacity and ventilation; this area has been remarkably free from infectious diseases in the past.

There is still no sweeper village at Khartoum, and again the authorities are urged to grant a sum of money for this purpose, as without doubt, with the looming of the White Nile Dam and the Gezira Irrigation Scheme in the near future, we shall have the greatest difficulty in maintaining the necessary conservancy labour.

There is not a sweeper class in the Sudan as in India.

MARKETS.

At Khartoum they are fairly satisfactory, but the new regulations have not been pressed owing to the excessive cost of and the impossibility of obtaining some of the materials.

WATER SUPPLY.

The municipal water supply has been laid on to forty-six new premises during the year, some being large compounds. The well, supplying part of Omdurman, has been protected as far as possible, and the supply, by no means ideal, has been rendered as safe as possible from external contamination. The adjacent river foreshore has been marked off, so as to prevent bathing and washing in this area.

Khartoum North still draws its water supply from shallow wells and the river, but there is no evidence of water-borne disease being present to any degree.

During the year, six wells were allowed to be opened and thirty-nine wells in Khartoum and Khartoum North were closed down.

Whenever possible the Sanitary Department insist on new wells being provided with pumps, so that the upper part can be completely filled in, thus preventing contamination from surface waters and the breeding of mosquitoes.

MILK SUPPLY.

The Khartoum North Dairy still supplies good quality milk, but owing to the war the equipment is bad.

The Veterinary Department's Experimental Dairy supplies a limited quantity of excellent butter and cream and milk in the case of invalids and young children. They have now moved to good quarters and have an excellent small farm for forage.

This year, in the three towns, 279 licences were issued to milk vendors. Of the samples of milk taken at random this year 14.3 per cent. were found adulterated and prosecution undertaken.

This year all cans for milk in Khartoum and Khartoum North have been stamped by the Sanitary Department, and every Sunday morning all the milk-sellers have to bring their utensils for examination to the Sanitary Department; this ensures better utensils and cleanliness, anyhow for one day in the week.

ICE SUPPLY.

Owing to attempts to corner this essential commodity and to buy out competing firms in order to maintain high prices, the Government, after due warnings which produced no effects, have set up an ice factory, which supplies a good and plentiful amount of ice at a reasonable price. The reduction of the cost of ice by 50 per cent. has been a great boon to the general public.

Food Supply has been ample, but prices have gone up considerably. The cost of flour and sugar has risen apparently out of all proportion to the supply and is due to profiteering. The matter has been considered for some time by the authorities, and it is hoped that more drastic measures will be taken to do away with this unnecessary evil. Bread may now not contain more than 75 per cent. wheat flour.

The hutchers also raised and maintained the price of meat above the legal maximum, but this matter is now being more effectively dealt with.

The good rains and high river last year have enabled the general native public to get their staple food at reasonable prices.

Offensive Trades.—The local trade in curing skins and hides has greatly increased owing to the war, and this has again raised the vexed question of sites for these businesses.

In the past, the businesses were allowed to be started in most unsuitable sites in the town, but the Governor has now issued orders that the present businesses are to be removed to specially approved sites within three months of the end of the war.

The premises are ordinary dwelling-houses and compounds in good residential districts, and should never have been allowed to be used for their present purposes.

Schools.—The general standard of health, physique and cleanliness was good.

Enlarged tonsils, adenoids and eye diseases are not prevalent.

Arrangements have been made with the Assistant Director of Education to issue circulars to the Government schoolmasters ordering them to make inquiries about the reasons of absence of children, and if due to illness presenting certain stated symptoms, the children are not allowed to return before medical examination.

This was found desirable, as on several occasions children have been found to have been ill with chicken-pox, measles, whooping-cough or mumps and without medical attention and were allowed to return to school, while still infective, by their parents.

Omdurman still remains without any sanitary staff, except two mosquito brigade men, who were granted this year.

Meteorological Statistics.—The following table gives the maximum and minimum temperatures recorded.

Year	1915 May	1916 April	1917 May and June
Maximum ...	115.5°F.	112.8°F.	109.4°F.
	January	January	December
Minimum ...	50.0°F.	47.8°F.	51.6°F.

Colonial Medical Reports.—No. 99.—Khartoum and Omdurman (continued).

METEOROLOGICAL OBSERVATIONS AT KHARTOUM, 1916-17.

Month 1916	Max. Temp. °F.	Min. Temp. °F.	MONTHLY MEAN			Relative humidity °F.	M.M. Rain
			Max. Temp. °F.	Min. Temp. °F.	Relative humidity °F.		
October	103.1	68.0	99.9	74.4	32	...	Drops
November	100.2	64.0	95.0	70.0	31	...	Nil
December	92.0	51.6	85.7	60.7	32	...	„
1917							
January	98.5	46.4	86.5	57.0	31	...	„
February	95.0	52.4	89.5	60.0	24	...	„
March	109.2	54.0	96.2	65.1	18	...	„
April	108.6	63.5	102.4	72.3	15	...	„
May	109.4	61.5	102.4	79.6	20	...	0.1
June	109.4	69.7	104.0	77.0	41	...	33.6
July	108.2	69.7	104.7	80.5	38	...	Nil
August	107.6	69.8	100.5	77.7	57	...	24.4
September	104.7	71.0	99.4	76.7	50	...	17.5
Total							75.6

Table giving the mean maximum and minimum temperatures, the mean humidity and the rainfall for the last three years ending September 30, 1917:—

	Oct. 1 to Sept. 30	1914-15	1915-16	1916-17
Mean maximum °F.	99.4	97.3	97.1	97.1
Mean minimum °F.	71.8	70.8	70.9	70.9
Mean humidity	32.6	35.08	32.4	32.4
Rainfall, mm.	164.2	146.9	75.6	75.6

The rainfall was very deficient, though the Nile a record since the occupation.

It appears that the mean humidity depends more on local rains than on a high Nile.

Colonial Medical Reports.—No. 100.—Bengal.

TRIENNIAL REPORT ON THE LUNATIC ASYLUMS IN BENGAL FOR THE YEARS 1915, 1916 AND 1917.

By Surgeon-General W. H. B. ROBINSON, C.B., I.M.S.

Surgeon-General with the Government of Bengal.

CALCUTTA.

The Insane Ward at the Albert Victor Leper Asylum at Gobra, where the leper lunatics were being treated, was, towards the end of the year 1916, declared to be a lunatic asylum under the Lunacy Act of 1912; this raised the number of lunatic asylums from three to four.

During the year 1917 the total accommodation of the lunatic asylums in the Presidency was raised from 1,094 to 1,174 by 80 beds. This increase was mostly at the Berhampore Asylum, where 70 additional beds were provided by converting some godowns and workshops into barracks.

There was some overcrowding at the Dacca Lunatic Asylum during the latter half of the year 1917; much space on the male side was taken up by single cubicles which were constructed for the segregation of dangerous lunatics. Arrangements have, however, been made to make up the shortage at Dacca by providing extra accommodation.

The total number of admissions was 231 in 1915, 227 in 1916 and 263 in 1917, the average for the triennium being 240, as compared with 200 admitted on an average during the preceding three years. The large increase in 1917 may be attributed entirely to the admission of a large number (viz., 55) of military insanes. Two voluntary boarders were admitted into the Berhampore Lunatic Asylum:

one, a female, in 1915; and the other, a police sub-inspector, in 1917. The latter was discharged cured.

Re-admissions numbered 13 in 1915, 14 in 1916 and 21 in 1917, of whom only 5, 7 and 7, respectively, were non-criminal lunatics. Of the 7 non-criminals of last year, 4 sought asylum treatment after enjoying freedom from insanity for periods varying from two to five years, and 1 for nearly ten years. The remaining 2, who had been taken away by their relatives before complete recovery, were brought back after a comparatively short period, viz., one year in one case, and four months in the other:

One hundred and twenty-nine lunatics were discharged in 1915, 175 in 1916, and 154 in 1917, average 153, as compared with 125, the average for 1912-14. Of the numbers discharged 81, 129 and 105, respectively, were cured.

Of the 55 military insanes admitted during the year 1917, 20, or 36.36 per cent., were discharged cured.

One leper lunatic recovered at Gobra and was discharged.

Besides those discharged cured, 39, 9 and 19 lunatics were made over to friends and relatives in 1915, 1916 and 1917 respectively, in an improved state. There still remain in the Indian asylums many lunatics who could be similarly discharged.

but the apathy and indifference of their friends and relations prevents this desirable relief.

The general health of the inmates was on the whole satisfactory. There was not a single case of cholera, and only one case of small-pox. General tuberculosis and pulmonary phthisis, dysentery, malaria and diarrhoea were the most prominent causes of admission. It is, however, satisfactory to note that there has been a fall both in the incidence of and deaths from phthisis and dysentery during the period under report.

Emetine was used with success in the treatment of dysentery at the Berhampore Asylum.

The stools of the inmates were examined as usual in this asylum. Ova of *Ascaris lumbricoides* and of *Oxyuris vermicularis* were found in 54 and 26 cases respectively.

The number of deaths fell from 120 in 1916 to 85 in 1917. The ratio per cent. of deaths to the daily average strength was 11.14 in 1916 and 7.91 in 1917. Of the 85 deaths in 1917, 19 occurred among the newly-admitted patients, one being a military insane.

Last year's death-rate compares favourably with that of other Provinces except Assam.

There were several cases of serious accidents and injuries in the Dacca Asylum. In the year 1915, two lunatics died by suicidal hanging and three of injuries inflicted by other lunatics. In 1916 one died of a severe injury dealt by a newly-admitted criminal lunatic. In 1917 one inmate received a fatal kick on the abdomen. It transpired on judicial inquiry that the lunatic attempted to run away and the injury was inflicted by certain keepers in their attempt to secure him. *Post-mortem* examination, however, revealed no marks of injury, and in the absence of sufficient evidence to prosecute the keepers they were punished departmentally—two with dismissal and one with degradation.

Accidents and injuries of only a trivial character occurred in the Berhampore Lunatic Asylum, while the Bhowanipur Asylum was entirely free from such occurrences.

There were four escapes during the triennium, all from the Dacca Lunatic Asylum; one, in 1917, a criminal lunatic, effected his escape by scaling the enclosure wall. All were recaptured.

The system of discharging criminal lunatics after recovery advocated in Government Resolution of 1888 could only be followed to a limited extent, only eight such cases having been discharged from the Berhampore Lunatic Asylum during the past triennium. Lieutenant-Colonel Newman, Superintendent, Dacca Asylum, thinks "that the stringency of the rules operates against reducing the number of this class to any appreciable extent."

The order of Government regarding the release of harmless lunatics convicted of trivial offences is carried out wherever possible; but many have to be retained on the ground of humanity as they have no friends. However, four such lunatics were released from Dacca and one from Berhampore during the last three years.

Particulars regarding religion, sex, residence and

previous occupation of lunatics do not call for any special remarks.

As regards age, the largest number of admissions was between the ages of 20 and 40, being, for that term of life, 73.46 per cent. of total admissions.

Mania was the most common type of insanity, accounting for the largest number of receptions. This type is, however, more amenable to treatment than others. The type which gave the next largest number of admissions was melancholia. The recovery under this head is comparatively slow. *Cannabis indica*, which accounted for 42 admissions in 1915, 39 in 1916, and 34 in 1917, was the next commonest cause. Two cases of general paralysis of the insane are reported to have been received at Berhampore in 1916, and the Superintendent was very positive as to the symptoms indicated being typical of the disease. One of them died last year and the other is said to have recovered. A third case was admitted last year into the Dacca Asylum who also died. Such cases are said to be very rare in India.

The various agencies sending lunatics to asylums pay little or no attention to the provision of information regarding causation, habits and associated conditions, which is of so much help to the asylum authorities in diagnosing and treating cases. For instance, insanity was ascribed to heredity in the majority of cases admitted into the Dacca Asylum last year, while toxic (chiefly *ganja*) was alleged to have been the most prolific ætiological factor in the cases admitted to Berhampore.

Last year the European Association raised the question of the accommodation and treatment of cases of delirium tremens amongst the Europeans and Anglo-Indians residing in Calcutta. The Association complained that the hospitals generally refused admission to such cases, and that great difficulties were experienced in the absence of definite orders in the matter. Delirium tremens being a form of insanity, my predecessor, Surgeon-General Edwards, decided that such cases should be taken to the Bhowanipur Lunatic Asylum, on a written order previously obtained from the Commissioner of Police for their admission as non-certified "under observation" cases. The Association was not, however, satisfied with this decision, as they said "it involved unnecessary hardship on the patient and his friends and saddled the person for the rest of his life with the additional stigma of being a lunatic." In order to satisfy the Association, arrangements have been made, with the approval of the Government, for the reception and treatment of such cases in the Presidency General Hospital.

The primary object of the manufacturing departments is to provide occupation to lunatics, which plays a very important part in the successful treatment of insanes. The Superintendents of the Berhampore and Dacca Lunatic Asylums have therefore always been very keen on this matter, and have employed the inmates on various kinds of manufactures according to the bent and capacity of each. 69.80 per cent. of the lunatics were em-

ployed on manufacture at Berhampore, while at Dacca 27.15 per cent. were so employed. An oil mill has now been installed in the Dacca Lunatic Asylum for the employment of lunatics who are unfit for other work. As an incentive to good work and a lure to idlers, hardworking and well-behaved lunatics have, as usual, been granted special indulgences in the shape of *pan*, tobacco, extra diet, and small money rewards varying from Rs. 2 to anna 1.

On the whole the sanitation, conservancy and general hygiene arrangements are satisfactory, although there is still a shortage of latrine accommodation at Dacca. At Berhampore there are shower baths in both male and female departments.

Special attention is paid to the dietary of patients in all asylums. It is simple, but sufficient.

The frequent occurrence of accidents at and escapes from the Dacca Lunatic Asylum was ascribed to the defective building arrangements and insufficiency of the keepers' staff. The sanctioned rate of their pay was also quite inadequate to attract a superior class of men.

With a view to remedy these evils, the menial and keepers' staff of the asylum were thoroughly reorganized in 1916, and the following structural improvements were carried out during the last two years:—

(1) Low enclosure walls and junctions of two cross walls in the female enclosure were raised and stand-posts affording footing to tops of walls removed.

(2) The main asylum gate was doubled with a view to keep inmates employed in the carpenters' shop situated between the gates, under lock and key.

(3) A guard-house was provided for men on duty.

(4) A fence was put up along the side of the tank in the female enclosure.

(5) The courtyard was fenced to allow of harmless lunatics being confined there by day.

(6) Separate cubicle accommodation was sufficiently increased to admit of the segregation of dangerous lunatics.

The improvements carried out in the Berhampore Lunatic Asylum during the past three years were:—

(1) The conversion of a ward into four single cubicles.

(2) The construction of a new godown and workshop in the eastern enclosures in connection with the scheme for increasing the asylum accommodation.

(3) The rebuilding of the dividing wall between the male and female wards; and

(4) The construction of a metalled road and a drain in the eastern enclosure.

Colonial Medical Reports.—No. 101.—Bengal.

REPORT ON THE WORKING OF HOSPITALS AND DISPENSARIES UNDER THE GOVERNMENT OF BENGAL FOR THE YEAR 1917.

By The Honourable Surgeon-General W. H. B. ROBINSON, C.B., I.M.S.

Surgeon-General with the Government of Bengal.

CALCUTTA.

THE number of the Calcutta medical institutions remained the same as in 1916, viz., twenty-two.

Altogether 31,572 intern patients were treated in the fifteen Calcutta hospitals providing indoor accommodation. The daily average number of such patients in Classes I, III and IV Institutions was 1,615.16. There was a noticeable increase in the indoor attendance at the Dufferin Hospital, the Presidency General Hospital, the Howrah General Hospital, and the Medical College Hospital, while the attendance fell off at the Campbell Hospital owing to a smaller admission from epidemic diseases, and at the Mayo Hospital.

The outdoor attendance at the Calcutta Hospitals considerably increased last year, patients having been afforded outdoor relief by 7.7 per cent. The largest increase occurred in the Kalighat Ram Chandra Goenka Hospital. But this institution worked only for three months in 1916. Nevertheless, it is very satisfactory that this new institution

has, within a very short time, gained such a large popularity. The large increase of patients at the Syama Charan Law Eye Infirmary is an indication of the great confidence of the public in this institution. It is unfortunate that no steps could so far be taken to commence work on the proposed new Eye Hospital for want of funds.

The accommodation available in the Calcutta Indoor Hospitals remained almost unchanged, the number of beds was 2,327 in 1917.

The nursing of patients of the Calcutta Hospitals was generally satisfactory. However, owing to the higher emoluments offered for nursing in the war hospitals and the demand for private nursing, increasing difficulties were experienced in almost all hospitals in obtaining nurses and also in keeping them when obtained. Many hospitals had consequently to work with a decreased staff during the greater part of the year.

Both cholera and small-pox were less prevalent last year than in 1916, the death-rate among the

general population having been 0.96 and 0.03 per mille respectively in 1917, against 1.5 and 0.06 per mille in the preceding year.

The city was free from plague for seven months of the year, in January and February and from August to the end of the year. There were 87 cases and 81 deaths among the general population. Plague cases treated in hospitals numbered 18 only.

The number of phthisis patients diminished from 2,447 in 1916 to 2,197 in the year under notice. Three hundred and twenty-six deaths occurred among 754 treated as indoor patients.

Patients treated for venereal diseases numbered 19,642, which was 1,183 more than the number for 1916. Venereal patients attended the Presidency General Hospital in increasing numbers last year (535 against 478 in 1916) for treatment by injection of Novo-arseno-benzol preparations. The Voluntary Venereal Hospital had 794 venereal patients (all females) as compared with 736 in the previous year.

Government gave careful consideration to the recommendations made by the Royal Commission on Venereal Diseases and have proposed to give effect to the following measures for the prevention and treatment of these diseases in this Presidency: (1) to open skin departments, in connection with the Medical College and the medical schools, for the practical instruction of medical students in venereal and skin diseases; (2) to distribute to venereal patients cards of instructions and warning. (3) to extend the Imperial Serological Laboratory at Calcutta, for the better diagnosis of these diseases by the laboratory methods, and (4) to supply gratuitously salvarsan or its substitutes to all hospitals and dispensaries for the free treatment of venereal patients. Schemes have been sketched out which are now under consideration.

Special attention was paid by Lieut.-Col. Waters, I.M.S., Civil Surgeon of Howrah, to the treatment of diabetes, by alimentary rest and it is reported that many interesting cases were treated by this method and valuable results obtained.

Major D. McCay, I.M.S., Professor of Physiology, Medical College, Calcutta, continued his investigation into the causation and prevalence of diabetes in India, and is now engaged in writing a detailed report on the results so far obtained.

Altogether 46,210 surgical operations were performed in all classes of the Calcutta institutions, being an increase of 1,051 over 1916. The largest increase occurred in the Campbell Hospital, this is largely due to an increase in the number of intra-venous injections.

DISTRICT HOSPITALS AND DISPENSARIES.

There were 700 dispensaries in operation at the beginning of the year, twenty-eight were opened during the year and four closed.

As the result of Government Order No. 271-75 T-Medical, District Boards have taken up the question of establishing more dispensaries in their districts and it is expected that the current year will see several new dispensaries coming into existence.

Altogether 6,340,564 patients received medical

aid in the Presidency outside Calcutta as compared with 5,972,517 in the previous year.

Diseases.—The largest attendance was as usual for malaria. Owing to the insufficient supply of quinine, it was not possible for many dispensaries to treat malaria patients with full doses: local reports show that subcutaneous and intravenous treatment is being more and more resorted to with marked success.

Small-pox was much less prevalent last year than in 1916. Hospital attendance shows a corresponding falling off. Only ten cases of plague were treated in district hospitals last year as compared with 31 in 1916. Cases of kala-azar increased from 740 (with 26 deaths) in 1916 to 1,846 (with 41 deaths) last year. Many of these cases were treated at the Kalna Mission Hospital in Burdwan, by the injection of tartar emetic with great success.

There was a slight increase in the number of patients treated for tubercle of the lung. The death-rate amongst those treated at indoor dispensaries was almost the same in both years.

Cases of venereal diseases treated in the district hospitals and dispensaries numbered 61,630. Medical officers have been instructed to keep a separate record of venereal patients treated with salvarsan.

One thousand one hundred and eighty-five patients suffering from leprosy were treated in the district hospitals and dispensaries last year, against 1,136 in 1916. Besides this, the three leper asylums at Bankura, Raniganj and Gobra housed and treated 824 leper patients. The investigation into the efficacy of gynocardate of soda in curing leprosy in which Lieut.-Col. Sir Leonard Rogers, I.M.S., is engaged, was carried on by him at the Gobra Leper Asylum. He reports:—

"During the last six months or so, I have been using a preparation of a higher melting point acid than that recorded previously, which I had found to be more active in my experiments at the Medical College. . . . Since this salt has been in use, progress has been greater in the very advanced and chronic cases. . . . In several cases, old standing and deep perforating ulcers, some of one or two years' duration, have been healed and in a few cases some return of sensation has also been noted."

He adds: "I have recently made what promises to be a further advance by obtaining from cod-liver oil a soluble preparation made on similar lines to gynocardate of soda, which has the great advantage of producing reactions and apparent improvement when given subcutaneously in small and practically painless doses."

In August, 1917, Government of India sanctioned an investigation into hookworm infestation in Bengal through the agency of the Deputy Sanitary Commissioners assisted by four sub-assistant surgeons. It was ordered that the preliminary inquiry should be made in jails and for this purpose the Deputy Sanitary Commissioners and the sub-assistant surgeons have been trained in the work.

Surgical Operations.—In surgical work there was an increase of operations in Mufassil hospitals and dispensaries of all classes, mission hospitals and railway lines taken together.

Colonial Medical Reports.—No. 102.—British Guiana.

REPORT OF THE SURGEON GENERAL FOR THE
YEAR 1917.

By K. S. WISE,

Surgeon General.

GEORGETOWN, DEMERARA.

HOSPITALS.

In the Public Hospital, Georgetown, the water-closets and septic tanks have given satisfactory service.

The special isolation block for infectious diseases at the Public Hospital, Georgetown, was affected by the unusual prevalence of enteric fever. At one period the accommodation was taxed to the utmost, the highest number of patients in this block on one day being eighty-five.

Every effort is made by the public health authorities to have as many cases as possible isolated in this special block. Further, every effort is made to avoid discharging these patients until the possibility of infection is absent. Bacteriological tests are carefully and repeatedly made before discharge. In most cases a period of two or three weeks further in hospital elapsed during convalescence after the usual time for discharge. It was hoped by this means to diminish as far as reasonably possible the chance of danger from acute carriers.

The mortality from pneumonia was again high this year, there being 69 deaths among 145 patients.

Phthisis brought 178 patients with 32 deaths, and bronchitis 178 patients with 15 deaths.

Special efforts have been directed to the block set apart for tuberculosis. It had become mainly a place for dying consumptive patients where they lingered till death relieved them, a place repulsive to most and feared by those sent there. This is now changed; patients such as the above are removed to the Alms House, the wards have been brighter and more cheerful, and a more generous diet provided; patients in the earlier stages, those in a curable stage and amenable to treatment, are alone admitted. Instead of shunning the block these patients now readily go there at a time when the disease can be checked and learn by practice the careful personal hygiene required of consumptive patients.

At the same time special types of treatment have been adopted, including the use of the different kinds of tuberculin.

LUNATIC ASYLUM.

The sanitary arrangements are as satisfactory as possible with the pail system.

In general this institution is overcrowded and the number of inmates admitted increased again this year, and it was necessary to increase the staff by three female and three male attendants. This

addition of staff was also partly to allow of more reasonable allowance for leave and sickness.

The building of increased accommodation has received very careful attention, but as there appears some tendency just now to decreasing average daily numbers the question has temporarily been left in abeyance.

At the bakery special efforts were made to use substitutes for wheat flour in view of the rapidly rising price and the possible difficulty of obtaining any at all. Both rice flour and cassava were found quite suitable for replacing 25 to 30 per cent. of the wheat flour.

Attention is specially drawn to the inadequate supply of water for fire purposes. There is always great delay in giving pressure when called for; the pressure when supplied is always inadequate; in the latter quarter of this year the water supply was entirely cut off every night.

The attack of chronic conjunctivitis resembling trachoma persisted through a considerable part of this year, but was limited to a few inmates.

LEPER ASYLUM.

Religious services and school attendance have regularly continued, and we owe many thanks to His Grace the Archbishop of the West Indies, the Reverend Father Purcell and the Reverend Charles Stephen, M.A., for their kindness.

As amusements regular concerts, secular and religious, are held. Variety entertainments and magic lantern shows are given.

Industrial work about the asylum and farming still form a great part of the inmates' occupation, and is of material assistance to the upkeep of the institution.

There were sixty-nine deaths during the year equivalent to 18.7 per cent. per annum. Fifty-five per cent. of the sixty-nine deaths were directly due to leprous lesions, while 45 per cent. were directly due to general diseases, such as senile debility, Bright's disease, malaria, &c.

No births took place during this year.

Careful experiments were made at the lunatic asylum bakery as to the use of rice bread (wheat flour, 70 per cent.; rice flour, 30 per cent.). Owing to lack of rice flour in sufficient quantities it was not possible to use this on a large scale until 1918.

PUBLIC DISPENSARIES.

Georgetown.

There are two dispensaries: No. 1 Dispensary at Broad Street Police Station, and No. 2 at the Public Hospital.

RETURN OF DISEASES AND DEATHS IN 1917 IN THE GEORGETOWN, NEW AMSTERDAM, SUDDIE,
BARTICA AND N.W.D. HOSPITALS.

British Guiana.

GENERAL DISEASES.

	Admis- sions	Deaths	Total Cases Treated
Alcoholism	17	—	17
Anæmia	78	4	78
Anthrax	—	—	—
Beriberi	—	—	—
Bilharziosis	—	—	—
Blackwater Fever	17	—	17
Chicken-pox	29	—	29
Cholera	—	—	—
Choleraic Diarrhoea	—	—	—
Congenital Malformation	—	—	—
Debility	262	51	262
Delirium Tremens	—	—	—
Dengue	—	—	—
Diabetes Mellitus	3	2	3
Diabetes Insipidus	—	—	—
Diphtheria	6	5	6
Dysentery	262	50	262
Enteric Fever	—	—	—
Erysipelas	1	—	1
Febricula	381	84	381
Filariasis	—	—	—
Gonorrhoea	196	—	195
Gout	1	—	1
Hydrophobia	—	—	—
Influenza	92	—	92
Kala-Azar	—	—	—
Leprosy	44	4	44
(a) Nodular	—	—	—
(b) Anæsthetic	1	—	1
(c) Mixed	—	—	—
Malarial Fever—	71	5	71
(a) Intermittent	1327	52	1327
Quotidian	—	—	—
Tertian	—	—	—
Quartan	—	—	—
Irregular	—	—	—
Type undiagnosed	—	—	—
(b) Remittent	1	—	1
(c) Pernicious	31	7	31
(d) Malarial Cachexia	1	—	1
Malta Fever	—	—	—
Measles	10	—	10
Mumps	3	—	3
New Growths—	—	—	—
Non-malignant	70	1	70
Malignant	44	10	44
Old Age	5	—	5
Other Diseases	—	—	—
Pellagra	15	7	15
Plague	—	—	—
Pyæmia	8	7	8
Rachitis	—	—	—
Rheumatic Fever	—	—	—
Rheumatism	172	—	172
Rheumatoid Arthritis	—	—	—
Scarlet Fever	—	—	—
Scurvy	—	—	—
Septicæmia	43	38	43
Sleeping Sickness	—	—	—
Sloughing Phagedæna	—	—	—
Small-pox	—	—	—
Syphilis	1	—	1
(a) Primary	32	—	32
(b) Secondary	29	1	29
(c) Tertiary	34	12	94
(d) Congenital	18	10	18
Tetanus	24	16	24
Tryptanoma Fever	—	—	—
Tubercle—	21	9	21
(a) Phthisis Pulmonalis	—	—	—
(b) Tuberculosis of Glands	—	—	—
(c) Lupus	—	—	—

GENERAL DISEASES—continued.

(d) Tabes Mesenterica	—	—	—
(e) Tuberculous Disease of Bones	—	—	—
Other Tubercular Diseases	—	—	—
Varicella	—	—	—
Whooping-cough	11	1	11
Yaws	115	—	115
Yellow Fever	—	—	—

LOCAL DISEASES.

Diseases of the—			
Cellular Tissue	752	30	752
Circulatory System	—	—	—
(a) Valvular Disease of Heart	25	4	25
(b) Other Diseases	140	38	140
Digestive System—	—	—	—
(a) Diarrhoea	240	46	240
(b) Hill Diarrhoea	—	—	—
(c) Hepatitis	15	—	15
Congestion of Liver	7	1	7
(d) Abscess of Liver	11	5	11
(e) Tropical Liver	—	—	—
(f) Jaundice, Catarrhal	—	—	—
(g) Cirrhosis of Liver	54	15	54
(h) Acute Yellow Atrophy	—	—	—
(i) Sprue	—	—	—
(j) Other Diseases	886	116	886
Ear	22	—	22
Eye	331	—	331
Generative System—	—	—	—
Male Organs	378	2	378
Female Organs	1892	75	1892
Lymphatic System	98	1	98
Mental Diseases	131	—	131
Nervous System	229	35	229
Nose	22	—	22
Organs of Locomotion	229	5	229
Respiratory System	1181	297	1181
Skin—	—	—	—
(a) Scabies	36	—	36
(b) Ringworm	—	—	—
(c) Tinea Imbricata	—	—	—
(d) Favus	—	—	—
(e) Eczema	—	—	—
(f) Other Diseases	674	7	674
Urinary System	876	263	876
Injuries, General, Local—	721	20	721
(a) Siriasis (Heatstroke)	—	—	—
(b) Sunstroke (Heat Prostration)	—	—	—
(c) Other Injuries	—	—	—
Parasites—	16	2	16
Ascaris lumbricoides	—	—	—
Oxyuris vermicularis	—	—	—
Dochmius duodenalis, or Ankylostoma duo- denale	174	14	174
Filaria medinensis (Guinea-worm)	325	24	325
Tape-worm	—	—	—
Poisons—	2	—	2
Snake bites	—	—	—
Corrosive Acids	—	—	—
Metallic Poisons	3	—	3
Vegetable Alkaloids	8	—	8
Nature Unknown	—	—	—
Other Poisons	4	8	4
Surgical Operations—	—	—	—
Amputations, Major	1047	32	1047
Minor	2812	—	2812
Other Operations	—	—	—
Eye	—	—	—
(a) Cataract	—	—	—
(b) Iridectomy	—	—	—
(c) Other Eye Operations	—	—	—

Country.

There are five country dispensaries situated as follows: (1) Demerara River, at Christianburg; (2) Berbice River, at Ida Sabina; (3) Upper Pomeroon; (4) Lower Pomeroon; (5) Moruca River. The dispensers in charge are provided with boats for the purpose of paying periodical visits to the different grants, homesteads and missions.

Free medicines were supplied to the following Missions: Saxacalli, Chalk Hill, Orealla, Epera, Sand Hills, Coomacka, St. Andrew's, Calcutti.

PRISON HOSPITALS.

The following shows the number of prisoners admitted and the number of deaths in these hospitals during the year:—

	Daily average number of Prisoners	Daily average number in Hospital	Admitted to Hospital	Died in Hospital
H.M. Penal Settlement ...	205	1.6	46	6
Georgetown ..	155	0.92	36	7
New Amsterdam ...	51	1.44	48	0
Total ...	411	3.9	130	13

In the prisons of Georgetown and New Amsterdam sickness has kept at a low rate, being in the major part malaria and intestinal disorders in those recently admitted.

Quinine was given to convicted prisoners in Georgetown and New Amsterdam.

At H.M. Penal Settlement during the last three or four years special and careful attention has been given to sanitary measures, and the superintendent has kindly placed a gang of prisoners constantly on this work.

The following shows the result:—

Admissions to hospital, 46; cases of malarial fever, 5; diseases of the alimentary system, 11.

The Director of Science and Agriculture kindly arranged for a special visit and report on fly-breeding places at H.M. Penal Settlement at the end of 1916 by the Government biologist. Careful attention has been given to the spots he indicated, with the result that during the greater part of the year few or no flies were to be found. In December, for two weeks flies were to be found in abundance in the cow-pen and abattoir. Diarrheal diseases are at a minimum and are mainly in those convicts recently arrived.

The small number of cases of malarial fever are all the more striking this year, since the abolition of Anopheles breeding places was the only anti-malarial work undertaken. No quinine was used for prophylaxis at H.M. Penal Settlement during 1917.

THE ONDERNEEMING INDUSTRIAL SCHOOL FOR BOYS.

The average daily number of boys was 140; the percentage of sick to this daily average was 1.56.

No disease of epidemic character occurred during the year. All the boys were inoculated against enteric fever.

The fly nuisance has been considerably lessened due to special efforts made by the superintendent and the medical officer.

ALMS HOUSE.

The average number of inmates in the whole institution was 782. The total number treated in the infirmary wards of this institution was 3,868 for the twelve months. The death-rate per cent. of patients treated was, however, 26.8 against 21.3 of last year.

The commoner causes of death were Bright's disease, chronic bronchitis, diarrhoea, chronic dysentery, phthisis, tertiary syphilis, senility and general debility.

A large number of those treated at this institution suffer from chronic and intractable ulcers.

Those admitted were carefully examined for hookworm infection. Of the 1,662 thus examined, 11 were found infected and treated by thymol.

The general increased cost of living has had a grave effect on those who exist on charity and many who were just able to keep themselves from the Alms House have been unable to do so longer, and this institution has found its capacity taxed to the utmost. Many Alms House cases have now to be accommodated in the public hospitals.

The pail system used for many years at the Alms House has now been changed and water-closets installed, much to the improvement of the whole institution. Since December, 1916, no pails have been in use and a source of much nuisance has ceased. Owing to the lack of sewerage in the city the water-closets are connected up to septic tanks, which have worked satisfactorily during the year.

GENERAL HEALTH.

The general health of the Colony during 1917 changed markedly for the worse, especially in the first and last quarter of the year, the mortality of which reached the unhealthy periods of 1909-11.

As usual malaria, hookworm disease and other anæmiating influences undermine the constitutional strength of the people, leaving them a ready prey to any acute disease, and rendering them unable to stem the progress or resist the exacerbation of chronic maladies.

Malaria is again on the increase, as usual taking a heavy toll amongst the infants and children. Respiratory and renal diseases have reaped an increasing harvest amongst our anæmiated population.

The population at December 31, 1916, was estimated as 313,859, and at December 31, 1917, as 313,999, or an increase of 140. There has been no natural increase this year (save on the sugar estates), the number of deaths, 9,549, being 616 in excess of the births, 8,933. The excess of immigration over emigration is 756, thus accounting for the small increase of population.

The birth-rate increased somewhat this year, though, as last year was a record in exceptional

decrease, the present year's birth-rate is still below the general expectation.

The death-rate for 1917 is 30.4 per 1,000 persons living. The average for the last ten years is 29.8. The mortality of infants continues at a generally lower level than during the last ten years, though a small increase has occurred since 1914.

The infant mortality rate for 1917 was 199 per 1,000 living births. The average for the last ten years is 204—about double what the rate should be.

There has been no case of cholera, yellow fever, plague or small-pox during the year. The last outbreak of small-pox was in 1904 and of yellow fever in 1885. There has been no case of plague or cholera in the last forty years.

URBAN DISTRICTS.

The city of Georgetown, in common with the rest of the Colony, showed an increase of births.

The number of deaths again showed an increase, being 1,545 in 1915, 1,552 in 1916, and 1,617 in 1917, or a rate of 30.2 per 1,000 living persons. In considering these figures one should remember amongst other things the much higher cost of living and the undoubted increase of poverty in the city.

There is an increase in the infant mortality rate, last year being 216. This is much below the general rate in years gone past, but is still double what it should be.

There was a considerable increase in the prevalence of enteric fever in the city, there being 281 notifications. This reached the maximum of fifty-four notifications in May and falling to six in December. Special efforts were made to isolate cases early in their onset associated with thorough disinfection.

Inoculation with antityphoid vaccine was offered free of charge to all, but especially to contacts of notified cases.

The actual number of deaths from enteric fever were less this year, in spite of the undue prevalence of this fever.

The city of Georgetown continues to rely on a very mediocre system of water supply and an utterly inadequate system of sewage disposal mainly consisting of midden pits. Under such circumstances the efforts of the Municipal Health Department will always be gravely handicapped, and much of the energy devoted to reducing this and other cognate diseases will be neutralized.

Malarial fever remains at an unduly high rate in this city. There are two large swampy areas—Queenstown Ward to the east and Nonpareil Park to the north of the city. *Anopheles* larvæ are readily found in both these areas. The Municipality began filling and levelling the Queenstown swamp, but unfortunately this is now ceased.

The town of New Amsterdam showed a still further decrease in births. The deaths have increased 20 per cent. The deaths exceeded the births by ninety-three.

In 1916 two notifications of enteric fever with

one death were recorded from this town, whereas in 1917 nineteen notifications and thirteen deaths were recorded.

VILLAGE AREAS.

These are extensive and scattered, and can only very slowly come under the influence of sanitary improvements.

As before, lack of drainage, presence of low bush and unnecessary vegetation leading to dark, moist and airless surroundings, irregular mosquito-breeding pools, unscreened barrels, and absence of privy accommodation represent some of the removable evils.

The customary water supply is of the most primitive character, is of bad quality, and at times lacking in quantity. Ponds and trenches fed by rain or surface peaty water led through canals for many miles, and freely open to surface pollution in most cases represent the only supply. Deep artesian wells have been drilled in various districts. Provision has been made for sinking wells elsewhere in villages. These wells provide a supply vastly superior to the trench water, and there can be little doubt that the extended provision of these wells will lead in time to a great reduction in the present numerous deaths, incalculable sickness and irreparable loss due to intestinal troubles. It is regrettable that these wells frequently cease flowing and require repeated clearing, thus denying the advantages which would accrue.

The International Health Board has completed its extensive campaign against hookworm disease. The generally prevailing diseases are malaria, pneumonia, bronchitis, diarrhoea, Bright's disease, and ankylostomiasis.

Enteric fever increased in the villages as elsewhere in the Colony, but nowhere became an epidemic. Cases were reported from areas all over the whole Colony.

Dr. McKinnon in the Skeldon district states that there is no attempt at sanitation in No. 78 village, and reports a severe epidemic of malaria over the whole district in the latter half of the year. Dr. Kennard in the Port Mourant district refers again to the lack of drainage in Gibraltar, Letter Kenny and Bloomfield. Dr. Gewand describes the drainage of parts of the Cotton Tree villages as deplorable.

Dr. Wills in the Mahaica district draws attention to the total lack of latrine accommodation and the unprotected, open trench water supplies.

In the Plaisance district Dr. Reid records a startling prevalence of filariasis.

In the Peter's Hall district Dr. Ferguson condemns the water supplies as unsatisfactory, and in the Belle Vue district Dr. Boase complains of the dense bush shutting in the houses. In the Philadelphia-Leguan district Dr. Earle refers to "the swampy house lots, the generally imperfect drainage, rice cultivation in immediate proximity to dwellings, parapets overgrown with grass and stagnant pools round burnt earth heaps."

Colonial Medical Reports.—No. 102.—British Guiana (contd.).

Referring to ankylostomiasis, Dr. Earle continues: "Neither the dangers of this disease nor those of malaria are sufficiently realized by our people generally." He further comments on the lack of even primitive latrine accommodation and the unsatisfactory nature of the water supplies.

In Wakenaam Dr. Ramdeholl considers the need of latrines urgent.

In Anna Regina district Dr. Teixeira describes hookworm disease with its terrible complications as rampant, especially amongst women.

In the Pomeroon River a Government medical officer visited twice and treated a large number of people for yaws with novarsenobenzol with manifest benefit.

SUGAR ESTATES.

The sugar estates in general present a great contrast in sanitary conditions when compared with the villages. One finds well-drained yards, a great reduction in mosquito breeding places, absence of all thick bush, and the universal provision of latrines.

The actual number of births on the estates during 1917 was 1,755, and of deaths, including persons from estates dying in public hospitals, was 1,343. There was thus a natural increase of 216 persons on the estates' population of 72,527. This is a marked contrast to the excess of deaths over births in the Colony as a whole. These figures relate not only to the specially kept indentured yards, but also to the outlying settlements and hamlets on the estates.

The prevalent diseases were much the same as in the villages. Enteric fever steadily increased on the estates as elsewhere during the first half of the year, but decreased again during the latter part.

At Skeldon and Springlands Dr. McKinnon reports a general increase of malarial fever, though infinitesimal compared to that in the villages around. At Port Mourant and Albion Dr. Kennard reports: "The Madras East Indians indentured of the last few years do not seem to acclimatize so well as the Calcutta ones, although, generally speaking, they are of better physique; this appears to be due to the want of care of themselves associated with a strong taste for rum."

At Cane Grove and Hope Dr. Wills records mucocentritis in epidemic forms from time to time. These have disappeared as suddenly as they arose. The direct causes have not been determined.

At Enmore, Non Pariel and Lusignan the year was ushered in by a severe epidemic of influenza; it became necessary to close the schools on these estates. The subsequent bronchitis and bronchopneumonia caused severe mortality amongst the children of school age.

On the estates of the Plaisance district Dr. Reid reports a general improvement, especially a reduction of malarial fever. Though enteric fever produced seventeen cases, none of these patients died. On the Peter's Hall district Dr. Ferguson records

his suspicions of cases of sand-fly fever and cerebrospinal meningitis. In the second half of the year influenza was prevalent.

At Golden Fleece Dr. Douglas reports great improvement in the general sanitary condition and drainage. Dr. Teixeira draws special attention to the prevalence of influenza at Anna Regina and the resultant heavy mortality from pneumonia. There have been noticeable improvements on this estate in many directions. Special pathways, extensive repairs and painting of ranges, refencing and delivery pumps to the water supply; special female bathrooms, new cottages, a crèche and a mosque, all completed. The old yard is also vastly improved, the drainage overhauled, old ranges removed and suitable cottages erected.

ENTERIC FEVER.

This year there has been a general increase in this disease all over the whole Colony. The notifications have been doubled in number and the deaths increased by 33 per cent.

Very careful inquiries were made into the various possible methods of infection. The following records show the opinions of those who have specially studied this question:—

Dr. Rowland: "Careful inquiry as to the cause of the spread of enteric leads us to believe that personal contact is the important factor in the Colony. The other common factors found elsewhere, such as infected milk, flies, and so on have been shown locally to have a small influence, but every endeavour to trace cases comes back to personal contact more or less immediate, with a previous case."

Dr. Wishart: "Personal contact with infected patients is a factor of great importance in this city, when especially amongst the poorer classes there is a tendency to regard the condition as 'only fever' and not to seek medical advice in the earliest stages of the disease. In the meantime the patient has been a constant source of danger, and the healthy inmates of the same house have been unwittingly exposing themselves to infection; even when the diagnosis has been established there is still in some quarters a great disinclination to allow the patient to be removed to the Public Hospital, the relatives often preferring to run the risk of infection by keeping the patients at home."

Dr. Ozzard: "With regard to the spread of the disease in this Colony, I do not think there can be much doubt but that it is spread by personal contact."

Dr. Wise: "Many vehicles of infection no doubt at times play a part in the spread of this disease in British Guiana, but the social conditions and habits of the people are so favourable to spread by personal contact that little doubt can be entertained as to the great influence of this method. There is much epidemiological evidence which gives great support to this view."

Dr. Wishart: "Drinking water as a source of infection may, I think, be excluded. Although a

few cases have been definitely traced to milk as the medium of infection, there is not in my opinion sufficient evidence to connect the cases with the milk supply. The few cases of milk infection have most likely resulted from carriers being unwittingly employed in the milk trade. Flies are probably of some importance as an intermediary source of infection.

"In my opinion the chief manner in which enteric fever is spread in the city is by infection from contact with persons suffering from the disease and by 'carriers.'"

Dr. Rose: "The writer believes that a careful consideration of all the facts as set forth in this paper will lead inevitably to the conclusion that the spread of enteric in Georgetown is due very largely to 'direct contact,' using the words in the sense already indicated."

Several other possible modes of infection were carefully investigated, and in view of the overwhelming incidence below the age of 18 special inquiry was made into the influence of attendance at school. No definite evidence was found that infection took place at schools. Attempts were made to detect "carriers" handling food without definite success.

The measures adopted to check the increasing prevalence were as follows:—

(a) Additional facilities for early diagnosis by placing the Government bacteriologist freely at the service of all practitioners for blood culture, &c.

(b) Early isolation of all diagnosed or suspected cases. Removal to the special isolation hospitals in the majority of cases.

(c) Thorough disinfection of the houses and fomites.

(d) Antityphoid inoculation of as many people as possible but especially of all contacts with sick persons.

(e) Prolonged isolation after cure in order to prevent infection of others by acute carriers as far as possible. At the Public Hospital, Georgetown, careful bacteriological examination was made of the urine and faeces of each patient.

(f) When possible improvement in the sanitary conveniences were made.

In order to deal with the greatly increased demand for antityphoid vaccine the staff of the Bacteriological Laboratory was increased. The vaccine is protective against typhoid and paratyphoid, and requires two doses for full protection which lasts two to three years.

TUBERCULOSIS.

This disease has shown a slight increase this year.

Eleven years of work have now been accomplished by the British Guiana Society for the Prevention and Treatment of Tuberculosis, and again it is a pleasure to record the excellent work and unremitting efforts of the lady health visitors who come into touch with the actual home life of the

people, and are able to instil into them the simple rules of personal care and attention.

Arrangements have been made to extend the Society's work to areas outside the limits of the city of Georgetown and to the town of New Amsterdam. The disease is, of course, most prevalent in the city of Georgetown and the town of New Amsterdam, but in almost every village and estate cases occur from time to time.

Overcrowding in the houses of Georgetown is a common fault, and the poverty of a large section of the town population adds greatly to other unsatisfactory conditions.

MALARIA.

This disease shows a considerable increase during the year, the deaths from malaria numbering 1,436 in 1917, 1,230 in 1916, and 1,264 in 1915.

The preponderating effect of malaria in causing sickness and deaths in British Guiana is amply apparent to those who study these questions. Malaria is directly responsible for from one-tenth to one-fifth of all deaths in the Colony, is directly responsible for a number of deaths varying between 955 in 1914 and 2,306 in 1907, and accounts for about one-fifth of the deaths of infants.

It does not appear to be commonly realized that each attack of this disease does some injury to the human machine, leaves some organ weaker than it was before and lessens the time during which the body can continue to resist the other diseases in its surroundings. The terminal illness is often not at all the one which has been the deciding factor in determining the patient's death; it is frequently but the last inimical process to attack the weakened patient, a patient exhausted and with diminished resistance, the result of previous attacks of malaria. It will thus be clear that the previous paragraph can represent only a portion of the indictment against malaria.

Malaria further is responsible for the excessive anæmia which results in a diminished birth-rate and excessive abortions, stillbirths, premature births and infants of a debilitated character.

Until the general public has sufficiently grasped the disastrous results of endemic malaria and the appallingly calamitous epidemics that occur year by year and will permit an adequate sanitary control of the innumerable malarial breeding spots common in towns, estates, villages and rural areas alike, the Colony's vital functions will continue to stagnate.

In the latter half of 1917 the following epidemic of malaria occurred in a medical district. In the last six months of 1914 there were 8 deaths from malaria; in the last six months of 1915, 31; in the last six months of 1916, 31; in the last six months of 1917, 121 deaths from malaria, or four times that of the previous year. Of these 121 deaths from malaria, no less than 95 were of infants and children under 16 years of age. This incidence amongst infants and children is characteristic of malarial epidemic—a veritable massacre of the

innocents. Whereas the first quarter of 1917 showed 105 births and 74 deaths, the last quarter showed 68 births and 154 deaths.

At present anti-malarial measures are little understood and their importance and value quite unappreciated. Attacks of fever and deaths from malaria are acts of fate unavoidable save by the charm of medicine, always present, a dangerous familiarity and an apathetic contempt. Sanitary measures directed to improvement are generally regarded as a wasteful unnecessary expense, often resented as an individual hardship or the venting of a personal spite.

Malaria is not alone a health problem which should be relegated to the attention of medical men alone; it is the most important economic problem of this Colony, and deserves increased consideration aside from its relation to health alone.

Special work in this direction has been done in selected areas with considerable success. The general malarial death-rate per 10,000 living persons in the whole Colony in the past five years varies between 30 and 45. In the city of Georgetown it is naturally less, varying between 11 and 22 per 10,000; on estates from 11 to 35, and in villages from 40 to 80 per 10,000. In selected village areas with the partial measures at the disposal of the Public Health Department the rate has been diminished to a variation of 18 to 30; in other words, half what the rate otherwise would be.

All villages of any size can obtain similar results, but it is necessary to supply a regular gang of two to four men constantly at work accomplishing the small, petty, irritating work which is of vital importance if malaria is to be kept at bay.

The present methods at the disposal of the Public Health Department will undoubtedly gradually change the conditions, but it will take perhaps a generation or more of time. Malaria waits for no man, listens to no excuses, and takes its terrible toll of infant and adult alike steadily month by month.

A special malarial gang is absolutely necessary constantly at work under the control of one who has had special experience and training in this work in this Colony. If these gangs are supplied, it would be easy to reduce the malarial deaths and sickness in any community, estates as well as villages, by a third, and probably in a few years by two-thirds or three-quarters. This is the proper and only cheap method of preventing this terrible disease.

Quinine has a distinct value in preventing malaria, but it must never be considered that the prophylactic use of quinine renders other measures unnecessary. Quinine can never take the place of permanent and thorough drainage with careful and constant attention to unavoidable water collections. Quinine prophylaxis does not entirely prevent malaria even when most thoroughly carried out, and it is, moreover, the most expensive way of obtaining a reduction of malarial fever.

It has been increasingly difficult to obtain quinine apart from the greater price, and in consequence quantities allowed to the schools, post offices, &c., have been reduced, and only supplied during the more malarial months of the year.

Much has been done on the sugar estates towards eliminating the periodic epidemics of malaria. These measures consist mainly in careful drainage in the yards with constant prophylactic use of quinine supplied free for the labourers. This excellent work should, however, be extended beyond the yards proper to pasture and other settlements on estate lands.

ANKYLOSTOMIASIS.

On the sugar estates the following measures are in force:—

(a) The provision of latrines on all estates, which in the majority of cases are well used.

(b) The microscopic examination and treatment of all newly arrived immigrants from India. Of these, as a rule, 65 to 80 per cent. are found infected.

(c) The microscopic examination and treatment of all immigrants who attend the hospital, whether with symptoms of ankylostomiasis or not.

(d) On several estates a microscopic examination and treatment of all immigrants resident on the estate is gradually proceeding, and it is probable that in many the degree of infection is now well below 20 per cent.

Several types of ankylostome anæmia are now rarely seen, the milder type of infection with chronic degenerative changes is most often encountered, the principal fatality occurring amongst pregnant females too anæmic to survive the extra burden of childbirth.

An active campaign in the villages against ankylostome infection has been carried out for three years by the International Health Board of the Rockefeller Foundation in America. The work is systematic and thorough, and is based on a house-to-house census, followed by microscopical examination and thymol treatment.

At the same time a sanitary campaign is carried on by the Government Public Health Department to enforce the erection of latrines in addition to general sanitary precautions. Several thousands of new latrines have been erected and are in use. Only a small percentage of houses in some areas are now unprovided.

INFANT MORTALITY.

The loss of life under twelve months of age is still very unsatisfactory. The infant mortality rate for the colony was 199 per 1,000 living births, and for the city of Georgetown 216.

Special training of midwives continues steadily at the public hospitals. Small subsidies are given to suitable women to encourage and assist them during training.

Since July, 1908, an outdoor Maternity Department has been maintained at the Public Hospital, Georgetown, for poor women who do not enter the hospitals but are delivered at their own homes.

In the public hospitals 657 women were delivered in the maternity wards and in the special estate hospitals.

The principles of infant care and feeding are now taught by all female teachers in primary schools under the advice of the Government medical officer of the district. Special classes with demonstrations for female teachers and assistants were held in Georgetown and New Amsterdam.

The Baby-Saving League is an organization, including the principal members of the community, subsidized by Government funds and carrying on work directed towards the reduction of infantile mortality.

MEDICAL INSPECTION OF SCHOOL CHILDREN.

This work was done by Dr. Rose, the Government Bacteriologist, who has had previous experience of these inspections in London and Birmingham.

Eighteen schools out of thirty-five were examined and 3,383 children from an average attendance of 5,500.

The principal characteristics disclosed are as follows: (a) Malnutrition in about 31 per cent. (b) Lack of cleanliness: dirty, 8.2 per cent.; verminous, 6 per cent.; skin diseases, 49.1 per cent. (c) Errors of vision in about 7.5 per cent. (d) Evidences of filarial disease in about 25.3 per cent. (e) Excessive prevalence of intestinal parasites about 57.1 per cent. (f) Small amount of enlargement of the spleen. (g) Low infection with hook-worm. (h) Rarity of tonsils and adenoids. (i) General excellence of the teeth. (j) Rarity of pulmonary tuberculosis.

Malnutrition is the result not of insufficient food alone, but is also produced even when food is abundant by chronic diseases, overcrowded rooms, lack of ventilation, dirty, verminous clothing, insufficient sleep, &c.

The filarial disease incidence was universal all over the city in every ward and every block, as would be expected from the known breeding-places of *Culex* and *Stegomyia* mosquitoes. On the contrary, the enlarged spleens indicative of malaria were found only in children coming from the outskirts of the city where it is known that anopheles breed.

Comment is further made on the buildings, &c. Every school house practically consists of one room alone, and no class-room accommodation is provided.

The school yards are universally unworthy of the name of playgrounds. Inadequate in size, they are mostly in a neglected condition and covered with rubbish. The privy accommodation is utterly inadequate, ill-kept, and in an extremely dirty condition. Surface soil pollution is apparent and extensive.

PUBLIC HEALTH DEPARTMENT.

The measures enforced in general are the clearing of inter-lot drains, adjusting the level of lots, weeding off low bush, whitewashing and hanking

pit privies, screening of vats and barrels, and removal of grosser sanitary nuisances.

This work is inevitably very slow in progress, and meets with much passive and, in places, active opposition. Much is done by persuasion and argument, but on occasions it is inevitable that appeal is made to the law.

QUARANTINE.

During the year quarantine was enforced for: (a) Plague against Venezuela, Brazil and Liverpool; (b) yellow fever against Venezuela and Brazil; (c) small-pox against Venezuela and Brazil.

The quarantine regulations have been duly enforced, and no case of infection from these diseases has occurred within the Colony.

Thirteen ships were visited by the health officer.

VACCINATION.

Special lanolinized lymph from the Lister Institute, England, is now used instead of glycerinated lymph, and is found more successful.

VENEREAL DISEASES.

In conformity with the Report of the Royal Commission on Venereal Diseases, arrangements have been made for the supply of salvarsan, &c., to all registered medical practitioners.

No legislation has yet been brought forward on this subject. This subject is now made a special lecture in the courses of training for nurses, dispensers, chemists and druggists, &c.

Special attention is drawn to the report of the medical superintendents of the lunatic asylum. Dr. de Freitas concludes that it is fairly safe to assume that syphilis does not play such a leading part in the causation of insanity as in more enlightened communities.

It is generally agreed amongst practitioners that syphilis runs a much milder course in this Colony than in Europe. The early stages rarely bring the patient to a doctor, the secondary conditions appear from time to time at the public hospitals, while tertiary manifestations are to be found in the almshouse and lunatic asylum. In no case, however, to the same extent as in Europe.

Of two hundred infants in the city specially examined, few, if any, showed any typical signs of syphilis. Gonorrhoeal ophthalmia is very rare.

Of 70 stillbirths specially examined by the Government bacteriologist (50 of viable age, 20 non-viable) definite evidence of syphilis has been found in 3 and doubtful evidence in 2 others, whereas in 45 viable and 20 non-viable fetuses no evidence of syphilis was discernible.

Salvarsan (novarsenobenzol, kharsivan, &c.) was used in 128 cases mainly at the public hospitals, Georgetown, and Suddie.

This remedy was also used extensively for yaws, 335 cases being injected largely in the hospitals at Georgetown, Suddie and Morawhanna. Twenty-two cases were done in Leguan, three in Wake-naam, and 145 on the Pomeroun River.

Colonial Medical Reports.—No. 102.—British Guiana (contd.).**BACTERIOLOGICAL DEPARTMENT.**

THE whole of the anti-typhoid vaccine used was prepared in this department, and where used has been followed by satisfactory results.

Constant investigation has also been made into the large number of typhoid convalescents dis-

charged from the isolation block in the George-town Hospital with a view to detaining any who still discharge the infection and are therefore carriers.

The customary routine examinations were carried out. Two hundred and eighty-five post-mortem examinations were made, thirty-six of which were by the instructions of the coroner.

Colonial Medical Reports.—No. 103.—Seychelles.**ANNUAL REPORT OF THE MEDICAL DEPARTMENT OF THE COLONY OF SEYCHELLES FOR THE YEAR 1917.****By J. B. ADDISON.***Chief Medical Officer.***VITAL STATISTICS.**

THE estimated population of the Colony at the end of the year was 24,528, being an increase of 419 on that of 1916.

The total number of births registered during the year was 719, being 29.31 per thousand of the estimated population, lower than last year, when it was 30.9 per thousand.

The total number of deaths for the year was 506, a mortality of 20.63 per thousand, being an increase on last year, when it was 16.75 per thousand, the increase being largely due to the high mortality amongst labourers returned from German East Africa.

There were 55 stillbirths during the year, higher than last year, when 53 were registered.

The number of children who died under 5 years of age was 182, and of these 81 were under the age of one; last year the number was 128 and 54 respectively.

METEOROLOGICAL STATISTICS.

The mean temperature for the year was 77.55, lower than last year, when it was 78.9.

The hottest month was April and the coolest August.

During the year the months of January and December were the wettest, and the driest months were May and October; only 0.45 inch of rain was recorded for both months.

The yearly rainfall was below the average, the total amounted only to 66.22 inches, about the same as last year when 67.41 inches were recorded.

The S.E. trade winds blew with an average force during the year.

DISEASES PREVALENT DURING THE YEAR.

During the last month of the year an epidemic of measles broke out, the type of the disease being mild. Infection probably started from contact between Seychelles lightermen and Malgash troops on board the French mail steamers from Madagascar.

Every endeavour was made when the first cases were seen to prevent the spread of the disease, those infected were put in quarantine, contacts isolated and the schools closed; but these measures were of no avail, the original case did not come under medical observation and so escaped notification, and a large number of persons were infected before any cases came under notice.

It is fifteen years since measles was last epidemic in Seychelles.

The principal event of medical interest during the year was the return of the Seychelles Labour Force from East Africa.

This force was organized as a general labour force to work in connection with the campaign in what was then German East Africa.

The force consisted of 791 men; of these the majority left for East Africa in December, 1916, and the remainder in February, 1917.

In May, 1917, it was notified that the greater part of the force was being repatriated on account of ill-health, 250 (37.25 per cent.) had already died.

As it was known that a number of men had died of dysentery and it was probable that the type of the disease was the bacillary one, which does not exist in Seychelles, it was decided that the men should be put in quarantine on arrival and arrangements were accordingly made to make accommodation for them; as the quarantine accommodation is meant to provide at the most twenty to thirty persons and as some hundreds were expected this was no easy task; however, by means of erection of temporary wards made of bamboos and leaves it was satisfactorily accomplished. To provide for the nursing of the sick, Miss Halkett, the matron of the Maternity Home, kindly consented to go to the Quarantine Station taking with her four nurses which she had herself trained, and as Captain Jewell, M.D., M.C., who was in Seychelles on sick leave from British East Africa, kindly consented to replace me, I went to the Quarantine Station myself.

The men arrived on May 17, on board the hospital ship *Guildford Castle*. Information had been received by telegram that there were fifty cot cases,

but this number was found to have been greatly underestimated, as apart from sixty cases of men who were acutely ill there were another fifty who were suffering from beriberi; the greater part of these were paralysed and completely helpless.

The number who arrived was 359; their general health was deplorable in the extreme, apart from the acute cases mentioned above they were practically all infected with malaria, large numbers were suffering from foul septic ulcers of the feet and legs and with few exceptions they had some degree of bronchitis.

The principal diseases from which the acute cases were suffering were dysentery, pneumonia and malaria; some had one of these diseases, some two, and many all.

The dysentery was of bacillary type. The mortality was high and during the period which the quarantine lasted there were twenty-five deaths.

During the period a sharp watch was kept amongst the men for cases of dysentery and diarrhoea (the milder cases preferred not to report themselves from fear of being kept in quarantine) and at the end of nine days all cases were under observation and treatment and those who were fit were liberated from quarantine. At the end of fifteen days there were still fifteen men who were acutely ill and they were transferred to the Victoria Hospital at Mahé where precautions to prevent the spread of infection could be taken.

Some fifteen days after the men were released it was reported that one of them was sick with dysentery in South Mahé. This man was well on his release from quarantine, his disease developed later and fearing to be detained he did not report for treatment.

The Assistant Medical Officer, South Mahé, immediately investigated the case and quickly found a large number of the man's relations had gathered round him during his illness. All of these were kept under observation which followed them to their homes when they returned after the man's death, and without exception these contacts developed the disease. It is difficult to explain why the infection was so virulent, but the insanitary habits of the people will probably account for it. There were in all some fifteen cases and of these a large number died. It was entirely due to the energetic measures taken by the medical officer of the district in following up contacts, despatching them to hospital when found infected, and disinfecting premises, &c., that the disease was stamped out. The incidence of this local outbreak was ample justification, if such were needed, for the original quarantine measures which were taken.

Many of them continued to have malarial attacks for several months. They all had a rooted objection to taking quinine and it was difficult to persuade them to continue treatment for a sufficient length of time.

The septic ulcers were very resistant to treatment and took a long time to heal; there seems evidence that they were in some cases infectious.

In all there were 327 deaths amongst the force, a mortality of 41 per cent.

The campaign against ankylostomiasis was started by Dr. J. F. Kendrick, representing the International Health Commission, and by the end of the year has been completed over two-thirds of Mahé.

The campaign is a most complete one and is carried out by means of house-to-house visitation, all who are infected being treated. The number of people found infected has been well over 90 per cent., and it is certain that the general health of the population will be very greatly benefited by the campaign; in fact, the improvement is already visible.

During the year a law was passed enforcing the provision of latrines for all inhabited premises and forbidding the depositing of excreta in any other places than these latrines. The type recommended was the pit latrine for all the country districts; this marks a very great sanitary advance in the country. Formerly, with the exception of houses in the town of Victoria, there were practically no latrines in the colony.

By the end of the year the law had been complied with throughout the country; it remains to be seen whether the people will adopt the habit of using latrines.

On the more important roads public latrines were erected by Government, and their upkeep provided for; it is hoped that several more such latrines will be provided in due course.

Veneral diseases continued to be prevalent, and though free treatment is given to all who are suffering from the disease and every encouragement given to those who are infected to come for treatment, but little real headway is made.

Otherwise the general health was good.

STATE OF THE TOWN OF VICTORIA.

The campaign against rats was continued during the year; the number of rats caught were 4,233 in the town of Victoria, less than 1916 when 5,762 were caught.

The general sanitary condition of the town during the year was satisfactory.

VACCINATION.

The vaccine supplied continues to give good results, the total number vaccinated in the Central District was 378.

QUARANTINE.

The station was used on several occasions for passengers coming from Bombay. The sterilizer on Hodoul Island was used to sterilize passengers' luggage and gunny bags imported from infected places.

HOSPITALS AND DISPENSARIES.

The total number of in-patients treated in the Victoria Hospital was 684, being an increase of 140 on that of 1916.

The total attendance of the out-patients treated during the year was 3,198, an increase of 251 on that of 1916.

The increase of in-patients and out-patients is due to the labourers who served in the Seychelles Labour Force and returned from German East Africa suffering from dysentery, &c.

MATERNITY HOME.

The number of admissions was 248.

The number of babies born was 187.

There were three cases of twin-birth.

There was only need for instrumental delivery in one case.

Cases of nephritis and eclampsia were somewhat numerous, four of the former and three of the latter; these diseases are certainly more common in Seychelles than elsewhere. The reason for this is difficult to decide.

Chloroform was given eight times, mostly in cases of incomplete abortion; these cases are common and are due, I think, to the prevalence of syphilis.

One of the main objects of the home, namely, the replacing of the old incompetent midwives by properly trained women, has been achieved, and since September 1 all certificated midwives, with one exception (and this quite temporary), have been trained at the home, the older class of certificated women having had the choice of being properly trained or ceasing to practise. The greatest credit is due to the matron of the institution, Miss Halkett, for the trouble she has taken in the training of these women, whose standard of education is a low one, and for the excellent result achieved.

The help which Miss Halkett rendered in undertaking the nursing of the returned labourers during their quarantine (referred to above) was invaluable, the self-sacrifice and devotion which she showed to these unfortunate people was beyond all praise.

REPORT OF THE ASSISTANT MEDICAL OFFICER, SOUTH MAHE.

During the year the health of the population was good until the arrival of what was left of the Seychelles Labour Contingent from German East Africa.

On June 25 a returned labourer died in the district. He had no medical treatment, and had resorted to sorcery medicine. He was surrounded by several members of his family for some days prior to his death; this man died of bacillary dysentery and all his friends that attended him contracted the disease.

The death-rate was very high, out of twelve people attacked of the first lot, only two escaped. By a strict system of quarantine, isolation and segregation of sick and contacts, by the burning of huts and all articles of bedding and clothing the disease was stamped out, and it did not spread beyond the families first attacked.

Malaria was present in all the returned labourers; under proper medical treatment and as the district is non-malarious the disease soon disappeared.

Most of the labourers had nasty suppurating ulcers on their legs, this has spread amongst the general population.

Measles was introduced into the district by school children from Victoria in the month of November. The attack so far appears mild, the children do not appear very ill.

A vigorous ankylostomiasis campaign was commenced on February 8 by the International Health Commission (Rockefeller Foundation). A census was taken of the district and a house-to-house visitation instituted. Practically speaking, all the population is affected with the disease. The campaign in this district has been a marked success. It is a pleasure to see how quickly the population has responded to correct and scientific treatment, and this remark applies especially to the juvenile members of the community; their fresh healthy faces is a marked contrast to their former dull, pallid and lethargic appearance.

The inhabitants of this district have three diseases that undermine and sap their vitality, viz., ankylostomiasis, syphilis and venereal diseases; one of these, ankylostomiasis, is attacked, and with ordinary care, efficient enforcement of the latrine law, stands a good chance to be cleared totally out of the colony; the other two diseases are still prevalent and are the indirect cause of thirteen still-births, and seven deaths in newly born infants. Of twelve deaths in this district of children under one year, seven may be laid at the door of syphilis infection.

REPORT OF THE MEDICAL SUPERINTENDENT, LUNATIC ASYLUM.

All the inmates enjoyed good health during the year, there were no infectious or contagious diseases in the asylum. There were four deaths during the year: two males and two females.

The average number of patients for the year was twenty-three, the daily average cost of maintenance was 42 cents or Rs. 12.60 for the month. We had during the year three paying patients who have contributed for the year the sum of Rs. 810 30 towards their cost of maintenance.

Three new patients were admitted: one male and two females. There were discharged one male and one female as not improved, and there died two females and two males. There was no case of second admission during the year and on December 31 there were twenty-one patients in the asylum: eleven males and nine females and one male out on trial. Since the asylum was opened in 1906 there were admitted eighty-five patients up to December 31, 1917. During that period twenty-three patients were discharged as cured, three as relieved, three not improved, and thirty-five died; the recovery rate is 27.06 per cent.

As in past years various means are taken to keep the patients amused; and to make them comfortable and happy, there is a weekly dance, and, weather permitting, walks along the neighbouring hills. In the wards games such as cards, dominoes, draughts,

&c., are provided and there is a small supply of illustrated journals given by friends of the asylum.

JOHN THOS. BRADLEY, M.D.,

*Medical Superintendent,
Lunatic Asylum.*

REPORT OF THE ASSISTANT MEDICAL OFFICER,
PRASLIN DISTRICT.

The general health of the district was satisfactory. There were a few cases of chicken-pox and a few cases of measles towards the end of the year.

Some of the labourers returning from Dar-es-Salaam suffered from malaria and some from beriberi. They were successfully treated at the dispensaries.

The number of patients treated at the Praslin dispensaries were:—

	Males	Females	Total
Bay Ste. Anne ...	11	17	28
Grand' Anse ...	23	33	56

Vaccination.—As usual there were a few failures on the first attempt, but all children were successfully vaccinated; the failures were no doubt due to stale vaccine.

Number of children successfully vaccinated: 1st time, 74; 2nd time, 7; 3rd time, 2; total, 83.

Vital Statistics.—The estimated population was 2,237.

	Males	Females	Total
Births ...	32	46	78
Stillbirths ...	2	3	5
Deaths ...	43	25	68
Marriages ...	—	—	7

There were 68 deaths.

Birth-rate, 34.86 per thousand inhabitants.

Death-rate, 30.39 „ „ „

Excluding thirty-seven deaths from Round Island, the death-rate would be 13.85.

Causes of deaths were as follows: Bronchitis, 3; cerebral hæmorrhage, 1; debility, 5; senile decay,

18; leprosy, 4; tuberculosis, 3; ankylostomiasis, 6; rheumatism, 2; nephritis, 5; heart disease, 9; pleurisy, 1; diarrhoea, 1; burns, 1; peritonitis, 1; cellulitis, 1; syphilis, 1; enteritis, 2; pneumonia, 2; meningitis, 1; cystitis, 1.

Round Island.—The number of paupers admitted was much above the average. Two large new huts were built by the Public Works Department. One of these was destroyed by fire, but was immediately rebuilt. Owing to the unusually large number of paupers we had to provide an extra labourer to help the dresser.

One leper escaped to Praslin but was brought back by the police. Three lepers died during the year.

LA DIGUE.

The estimated population was 1,506.

	Males	Females	Total
Births ...	24	24	48
Stillbirths ...	1	3	4
Deaths ...	8	13	21
Marriages ...	—	—	10

Birth-rate, 31.86; death-rate, 13.94.

Cause of deaths were as follows: Cerebral hæmorrhage, 1; tuberculosis, 2; leprosy, 1; heart disease, 3; enteritis, 1; debility, 9; acute rheumatism, 1; pneumonia, 1; ankylostomiasis, 1; eclampsia, 1; total, 21.

For the Whole District.

Population, 3,743; births, 126; deaths, 89; marriages, 17.

I continue to give free treatment of venereal diseases. A good number of patients were treated at the dispensaries; the only difficulty is to convince some syphilitic patients that they must attend the dispensary for some time before they can be considered cured.

(Sd.) J. G. MARIE, M.B., Ch.B.(Edin.),

A.M.O., Praslin District.

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